PROJECTIONIST

INTERNATIONAL

JANUARY 1953

VOLUME 28 • NUMBER 1

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men over 45

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American Cancer Society

INTERNATIONAL PROJECTIONIST

With Which Is Combined PROJECTION ENGINEERING

AARON NADELL, *Editor*

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MONTHLY CHAT

ELSEWHERE herein will be found a detailed summary of the remarkable and unprecedented variety of new developments which inventors and manufacturers in our field brought forward during the year 1952.

Eidophor, Natural Vision, Cinerama, mirrors that reflect light but not heat, magnetic soundtracks, transistors, drive-in size television, television transmission beyond the horizon . . . the reader is referred to the summary on another page for details . . . there has surely been no year like 1952 for technical progress in all the history of our industry!

* * *

If even a reasonable part of all these innovations become standard practice immense changes must come to the projection room and to the projectionist. Eidophor will bring with it a refrigerator and a vacuum pump for the projectionist to manage and maintain. Television of any variety embodies a very large number of new electronic circuits unlike any ever used in the theatre before; Natural Vision entails new interlock equipment; transistors promise to revolutionize practically all our electronic equipment and practices.

* * *

The projectionist naturally cannot hope to make himself a top expert in maintaining all these new devices plus and in addition to the very considerable responsibilities he has now; but he *will* have to acquire the competence to apply "what to do until the doctor comes" first aid in every case, because the show must go on until help arrives, and there is no one in the theatre except the projectionist who can see that it does.

IP pledges itself to do its share. Except only as patent secrecies and similar reticences may hinder, we will ferret out the facts and lay them before the craft in these pages. (See, for example, the detailed account of Natural Vision interlock arrangements elsewhere in this issue.) And any reader who may not see herein exactly what he wants is cordially and most heartily invited to ask for it.

* * *

All of us are going to have to learn "projection" all over again. That art and craft and science is now changing monthly. Like the Queen in Alice in Wonderland we are all going to have to run as hard as we can to stay in the same place. But it is becoming an increasingly valuable place to stay, for with all these new and marvelous developments the projectionist is no longer in the remotest sense an "operator." He is (and becoming more so daily) a very highly skilled, valuable, versatile, and resourceful technician, entitled to be respected and paid accordingly.

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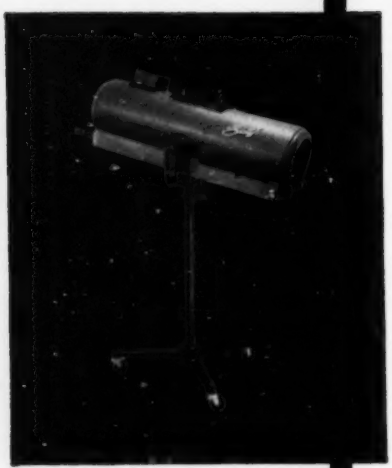

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INTERNATIONAL PROJECTIONIST

VOLUME XXVIII JANUARY 1953 NUMBER 1

NATURAL VISION—
Another Step in the Right Direction

Seeming to prove again that the public of today wants something new, Natural Vision (a system of third-dimension projection that requires patrons to wear Polaroid spectacles), is an SRO sellout at two California theatres. Natural Vision screen quality depends on the skill of the projectionist to a much greater degree than usual since exact superposition of two images is all-important.

By MERLE CHAMBERLIN

Supervisor of Projection, M-G-M Studios, Culver City, California

NATURAL VISION'S initial presentation of their Polaroid third-dimension process was placed before the public in Los Angeles on November 26, 1952. The event took place in the form of two simultaneous showings—at the Paramount Theatre, Hollywood, and at the Paramount Theatre in downtown Los Angeles. Combined seating capacity of the two theatres totals 5,000. The picture was "Bwana Devil," an Arch Oboler production for Milton Gunzburg.

Business the first week was beyond anyone's fondest expectations and, as this is written, they are still packing in the cash customers. This influx of paying patrons disproves the opinion, held by many in the trade, that the picture-going public would object to the necessity of wearing special Polaroid glasses in order to view a Natural Vision picture. Objections to date from the payees have been infinitesimal in comparison to the substantial increase in business at these two theatres.

The Natural Vision Process

The theory behind Natural Vision is neither new nor startling. For most of us it actually goes back many, many years. We can all remember stage effects utilizing Polaroid and, in more recent years—about 1936—Pete Smith gave us *Audioscopiks* and red and green glasses with which to look at them.

In the field of amateur photography, stereo-realists are becoming quite common-place. Refinements to gear the process to the professional 35-mm show were bound to be worked out. This has been done—not all the way yet, but enough to give us NATURAL VISION.

Photography of the picture in Natural Vision is theoretically geared to duplicate what is seen by our two eyes. The right eye sees the right picture and the left eye the left picture. These images are superimposed upon the brain, resulting in what we accept as a normal, well rounded momentary record of the thing in view.

The Natural Vision camera set-up has two 'eyes' which are represented by two complete cameras. These cameras are not placed side by side; if they were, the distance between lenses would be too great to obtain the necessary illusion. Mirrors are used to correct this condition.

The two cameras are mounted facing each other, appearing as if one lens was recording an image from the other lens. The image is actually photographed from front surface mirrors which are placed between the lenses at the required angle so that the ultimate photographic records on the negatives in the cameras are as if the same scene were recorded by two cameras 4" apart—4" having been accepted as being the average distance between a pair of human eyes. This naturally results in two separate negatives, either of which is a complete record of the action. The only difference between these two negatives is the slight offset caused by the spacing of the front surface mirrors.

Projecting Natural Vision

Positive prints from these two negatives are then made and that is where we, the projectionists, come in. The projection of Natural Vision or any similar process is of necessity an extremely precise operation. The two prints, either of which can be shown as a separate, normal flat picture, are projected simul-

taneously, which necessitates making provisions for two projectors to operate as one piece of equipment.

Focus, steadiness and light are very important. Any deviation from normal, efficient reproduction results in an unfavorable picture on the screen. The reasons for this condition are many. The two super-imposed pictures are projected through Polaroid filters installed in the portholes. The filter on the right-hand machine takes care of the image for the right eye. The left eye is taken care of by the left projector. Patrons in the theatre (as well as the projectionists in the booth) must wear Polaroid glasses to properly view the picture. Without the glasses the picture becomes an unpleasant double image that is a definite strain on the eyes. Any transposition of film or filter, (right to left—left to right) would force the patron to view the show as though he were cross-eyed

Electrical Interlock

The major preparatory operation in the projection room is the interlocking of the two machines. There are two methods of accomplishing this. The most expensive way is the electrical interlock. It is also the most positive, fool-proof and least dangerous method. A pre-fabricated electrical interlock system requires no 'customizing' for each specific theatre to take care of vertical and horizontal angles, etc.

Electrical interlock is based on selsyn motors, which are best described as rotary transformers. When two of these motors are connected in parallel they assume a position where no current will flow. This position is exactly the same for both motors. If one rotor is turned the other turns to the same position until again no current flows.

The regular drive motors are used on the projectors but one selsyn is also coupled to each machine. These keep the regular motors from drifting apart. If one projector head is tighter than the other and has any tendency to lag, the selsyn on the leading machine will pull the other motor to it. No matter what the condition, outside of a complete stop due to a freeze-up or similar accident, these selsyns will turn together, revolution for revolution. All four motors are thus locked together electrically and operated from one control. After locking, one switch turns everything.

Mechanical Interlock

The mechanical interlock involves the use of a rod or chain to couple the two machines together. It is not practical except with a very few soundheads. With others, angle, speed and hazard to the men in the projection room are important drawbacks of this system. A rotating bar or chain between the machines presents a continual hazard to the projectionists. It is doubly so when we consider the fact that this piece of equipment must be placed at the center, or most important station, in the booth. As used to date, the mechanical interlock calls for operating both motor switches simultaneously, but smoother operation can be realized by wiring both projector motors to one switch.

Interlocking the machines eliminates the changeovers and consequently eliminates the continuous show. To partially offset this condition 5000' reels and 24" magazines are utilized. The picture, as presented in Los Angeles, is screened for approximately 55 minutes, after which there is an intermission of sufficient duration to provide ample time for re-threading the two projectors. There have been very few objections to this intermission from the patrons. There are naturally no objections from management because the theatre receives an automatic concession break.

Natural Vision or any third-dimension system using Polaroid must be projected on a reflective, semi-directional screen. The ordinary matt surface theatre screen will not reproduce the required separation. The two theatres now screening "Bwana Devil" have installed the new Walker Hi-Intensity screen which provides efficient reproduction of both standard and third-dimension projection.

Conclusions by the writer following several trips to the theatres and discussions with patrons, promotors, projectionists and others interested in the theatre, are as follows:

(a) The industry and press panned the show unmercifully.

(b) The quality of the prints leaves much to be desired.

(c) The presentation requires each patron to wear glasses.

(d) The viewer must maintain a position within 5° of right angles to the screen or he loses the illusion.

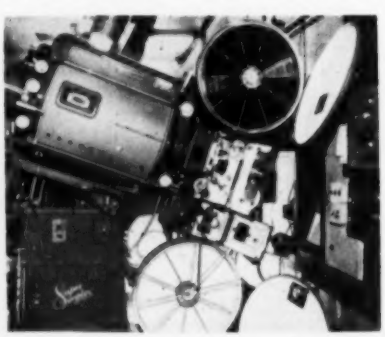
(e) AND MOST IMPORTANT: Despite adverse criticism, the two theatres are doing more cash business than at any time in their respective histories—box office receipts are higher than when they presented NAME stage shows.

In view of the foregoing it looks like we, the projectionists, are being handed another tool. The ultimate presentation of Natural Vision depends to a large degree upon the skill of the man in the projection room. Each and every one of us must be ready to take it in stride. Modification of our equipment is comparatively reasonable from the economic standpoint. Assuming that our regular equipment is in top condition, an interlock system and a new screen does the job. So—it looks like we better get ready for another New Deal in projection.

Some Technical Details of Natural Vision

The following details have been abstracted by IP from a technical report on Natural Vision circulated by United Paramount Theatres to its projectionists and managers.

OWING to differences in design of soundheads, all projection rooms cannot advantageously use the same type of interlock. Either the mechanical or electrical interlock may be more practical, depending upon the type of soundhead installed. With most soundheads, the electrical interlock is preferred; these are the kind that have relatively high speed motors which are mounted in front of the soundhead and operate at speeds of from 3450 to 1750 revolutions per minute. If such motors were linked mechanically by any simple contrivance, a high-speed belt, chain or shaft would obstruct a critical location in the projection room. With such equipment, the electrical interlock explained by Mr. Chamberlin herein is far preferable.



Projector equipped with 5,000-foot reels and interlock selsyn motor—extreme right.

Where the soundheads are Western Electric types 206 or 208, the electrical interlock is less practicable and the mechanical interlock more so, and a mechanical arrangement is preferred. In this equipment, a speed-reducing gear exists, interposed between drive motor and the projector. A mechanical interlock can be coupled to the low-speed (360 rpm) side of the drive. A shaft free to revolve, and having a sprocket wheel at either end, is mounted along the front wall of the projection room, under the ports; a sprocket chain from each projector drive runs forward to the two sprockets on the shaft. This equipment is very simple, is not in the way, and does not operate at a dangerous speed.

Assuming that the theatre is normally equipped and its apparatus is in good condition, the following materials are all

Night in day...

The best moonlight is the light of the noonday sun...

Obvious, of course, to an industry trained in modern cinematographic technics. Equally obvious is the need for infinite care in the choice of film and filters—in keying film and situation... in co-ordinating method and result desired in processing.

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In maintaining this service, the Eastman Kodak Company has branches at strategic centers... invites inquiry on all phases of film use from all members of the industry. Address: Motion Picture Film Department, **Eastman Kodak Company**, Rochester 4, N. Y. *East Coast Division*, 342 Madison Avenue, New York 17, N. Y. *Midwest Division*, 137 North Wabash Avenue, Chicago 2, Illinois. *West Coast Division*, 6706 Santa Monica Blvd., Hollywood 38, California.

Haig Sakajain, chief projectionist for Southside Theatres in California, is shown checking the selsyn installation at the Hollywood Paramount Theatre. He has his left hand on the interlock selsyn motor and his right hand on the regular drive motor. In future installations these will be placed side by side instead of in line, to eliminate alignment problem.

that are needed to convert for Natural Vision three-dimensional projection:

Interlock, mechanical or electrical (1)
Metallized-surface perforated projection screen (1)
24-inch magazines (4)
23-inch projection reels (4)
Porthole frames for holding polaroid filters (2)
Polaroid filters (4)—two of these are spares
Test film, 100 feet long (1)
Staticmaster brush, for cleaning the filters (1)

Except for the screen, all of these can be purchased from Natural Vision. The screen used in the California showings was the Walker P. M. Polarized High Intensity, sold by National Theatre Supply Co. The Staticmaster brush is manufactured by Nuclear Products Co. of El Monte, Calif. A nuclear material—polonium—is built into its ferrule. The radiation from this metal slightly ionizes the air, neutralizing the static electricity that causes dust to cling to surfaces.

Electrical Interlock Installation

The electrical interlock kit consists of the following:

Connecting cable (1)
General Electric selsyn motors (2)
Sprockets, to keep selsyn speed below 1200 rpm (4)
Lengths of sprocket chain (2)
Motor mounting plates (2)
Motor mounting bolts (12)

The two holding bolts at the left side of each drive motor are removed; two of the long bolts furnished are substituted—threaded up from the bottom on the regular motor bracket—and tightened; the motor mounting plate is slipped on these protruding bolts and fastened to them (after aligning) with washers and nuts.

Each selsyn motor is then loosely mounted on its mounting plate and sprockets installed on the selsyn motor shaft and on the drive motor shaft (large sprocket on the selsyn). The silent-chain connection between selsyn sprocket and drive-motor sprocket is installed and adjusted, and the selsyn motor mounting bolts are then tightened down.

Selsyn motors are inter-connected by means of the electrical cable supplied.

Both projectors are turned by hand several times as necessary until each is in a position meeting these three requirements: (1) intermittent movement has just turned; (2) shutter is straight up and down, and (13) Allen set screws on selsyn motor are straight.

With projector positions synchronized as above, the selsyns are energized by plugging in the AC plug of the electrical cable that connects them. The projectors will now remain synchronized. If the position of one is changed by hand, the selsyns will automatically make the same change in the position of the other; in operation, if either motor lags the selsyns will pull it ahead.

(When the theatre is closed down at night the selsyns are de-energized by unplugging the cable.)

Projection Room Changes

Aside from installation of the interlock, whether mechanical or electrical, the following changes are necessary in all projection rooms:

The regular drive motors are wired to a common switch so they will start and stop together. If these motors are not switched simultaneously a serious strain would be thrown on the interlock system.

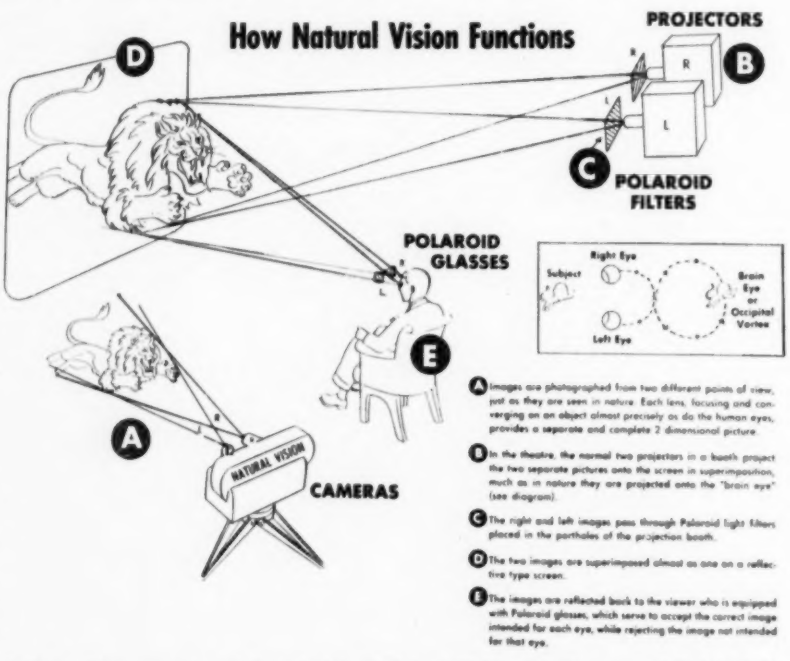
The 24" magazines are installed. If the projector pedestal interferes with the installation of the lower magazine, the latter must be offset for clearance. A wedge for this purpose must be made up in a local machine shop.

The twin images of the third-dimension screen image are displaced on the screen by exactly the proper distance only if projector alignment is perfect. To obtain this condition of alignment, short loops are made from the test film furnished, and projected simultaneously. Projection light is reduced to a minimum to prevent warping of the film. The projectors are then realigned until the two sets of lines projected from the two test loops superimpose perfectly. If obsolute perfection cannot be obtained it is at least necessary to make certain that lines from the left projector stay to the left of lines from the right projector. A reversal would produce serious eyestrain; any imperfection at all of alignment produces some eyestrain.

The porthole filters are installed. Each filter frame consists of an upper bar with rings, and a lower bar with clips. The location of the center of the light beam in the projection port is found, and the upper bar so mounted above the port that the polaroid filter will be centered on the light beam.

The upper bar must also be accurately level—for this reason a spirit level is supplied with the Natural Vision conversion "package." The lower bar need

(*Continued on page* 28)


How Natural Vision Functions
PROJECTORS
D
B
R
L
C
POLAROID FILTERS
POLAROID GLASSES
Right Eye
Subject
Brain Eye or Occipital Vortex
Left Eye
E
A
NATURAL VISION
CAMERAS
A Images are photographed from two different points of view, just as they are seen in nature. Each lens, focusing and converging on an object almost precisely as do the human eyes, provides a separate and complete 2 dimensional picture.
B In the theatre, the normal two projectors in a booth project the two separate pictures onto the screen in superimposition, much as in nature they are projected onto the "brain eye" (see diagram).
C The right and left images pass through Polaroid light filters placed in the portholes of the projection booth.
D The two images are superimposed almost as one on a reflective type screen.
E The images are reflected back to the viewer who is equipped with Polaroid glasses, which serve to accept the correct image intended for each eye, while rejecting the image not intended for that eye.

This graphic presentation of the principle of Natural Vision projection was distributed at the California showings and subsequently circulated by United Paramount circuit to its projectionists and managers.

1952: A Wonder Year for Progress

Eidophor, Cinerama, Natural Vision, led parade of marvelous advances such as this industry has never known in any one year of its history, while many other less glamorous but intensely practical developments also added to our gains.

By LEROY CHADBOURNE

NO YEAR in the entire history of the motion picture industry has seen such immense and widespread gains in its technology as the one just closed. Some of these, Eidophor, Cinerama, Natural Vision, were stunningly spectacular. Others, such as a mirror that does not reflect heat, or TV beam transmission beyond the horizon, though less glamorous, may develop a quiet but tremendous importance.

Not all of these advances are in actual use. Cinerama and Natural Vision are, but only on a specialty basis thus far. Of the two, Natural Vision, which costs less for equipment and personnel than Cinerama, is spreading more rapidly.

One other highly significant advance is not a 1952 development at all, but merely a report of growth. In that year the number of American theatres equipped for large-scale television increased, for the first time, beyond 100. Also, in 1952, large-screen television was shown in a drive-in theatre for the first time.

The pages of this publication enscroll the record:

Heat-Transmitting Mirror

In February's issue, page 14, will be found Dimmick and Widdop's discussion of the heat-transmitting mirror. Light from the projection arc striking this lamphouse mirror is reflected to the aperture in the usual way, but *heat* from the arc is not because the mirror does not reflect heat. The heat is transmitted—passes right through the mirror and could then be absorbed by asbestos or by a water-plate—it does not get to the film.

This result is produced by ". . . the interference effect within films of dielectrics deposited on the glass. The mirror described . . . reflects more than 95% of incident light and transmits a large part of the energy beyond 7000 A (Angstrom units)." Such mirrors have been produced; they are not yet, however, in commercial production.

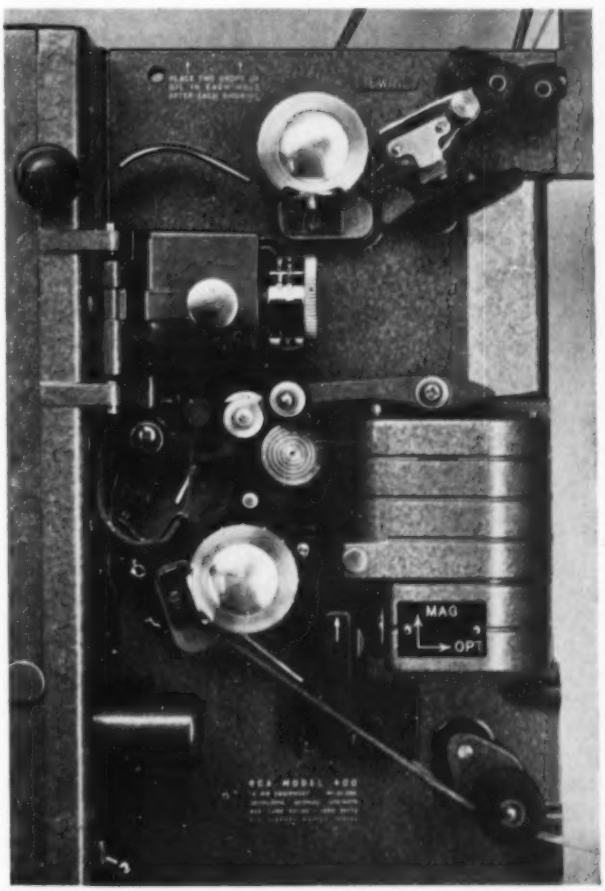
The value of these mirrors to drive-in theatres is obvious, but they have a further connection with some of the other developments of the year 1952. Cinerama, it may be remembered, needs three projectors and three arc lamps. Although its sponsors conducted some elaborate tests and selected what they considered to be the steadiest-burning lamp on the market (IP for December, page 34), they still could not achieve the impossible and keep three different carbon arcs burning at exactly the identical brightness and color. In consequence, as these columns reported in October (page 11): "The projection light on the three panels is often unmatched as to both brightness and color tone. . . . The white-faced Scotch bagpiper who marched across the screen from one panel to another instantly became sunburned!"

Members of the craft will not easily believe that Cinerama engineers or anyone else is very likely to get identical light out of three different arcs, but if a heat-transmitting mirror permits the use of one super-arc to illuminate all three Cinerama films then the desired result would be attained.

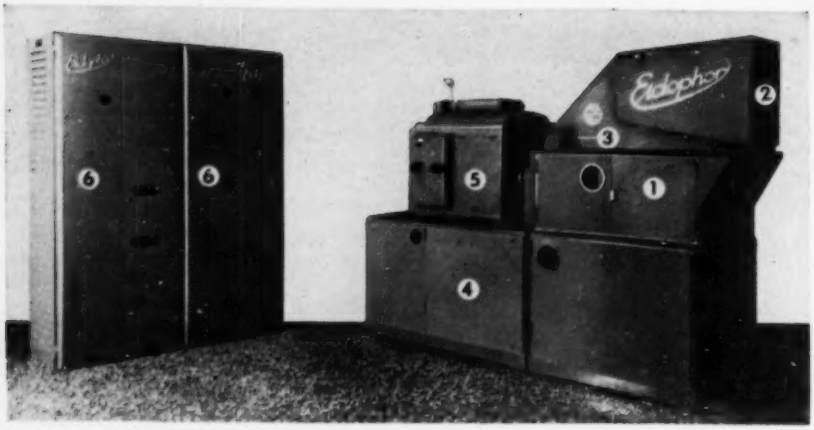
And in the case of Eidophor: the heat of the arc is an important factor in altering the viscosity of the liquid surface on which the TV image is formed (July, page 14), and in promoting its evaporation. To counteract these two undesirable effects, a refrigerator is built into the equipment to hold down the temperature of the Eidophor liquid, and a vacuum pump added to remove its vapor as fast as it appears. *Cold* light from the arc would assuredly reduce the load on both refrigerator and pump, permitting the use of smaller, lighter, and less costly equipment for those two functions; and might just conceivably—in spite of the fact that the liquid is also heated to some extent by electron beam bombardment—permit entire elimination of either or both of those components.

Magnetic Sound

Possibly portentous for the theatre was the introduction, in 1952, of magnetic



Magnetic soundtracks came into common daily use in 16-mm projection during 1952. This RCA-100 16-mm projector can be set to play either a magnetic track or standard 16-mm optical track; and also to record magnetic sound on suitably "striped" 16-mm prints.



Eidophor theatre color TV projection equipment. Projector proper is the assemblage at right, wherein (5) is the arc lamp; (1) the projector; the projected light-beam, deflected by mirrors, emerges from hood (2); (3) indicates the color wheel housing, and (4) shows the housing for the refrigerator and vacuum pump. Cabinets (6) contain the TV receiver and power circuits.

soundtracks to supplement (conceivably in the end to supplant) optical soundtracks. A number of *magneto-optical* 16-mm projectors were described herein during 1952, beginning with the one pictured on page 23 in the June issue. And in December (page 23) these columns presented an 8-mm magnetic sound projector.

Magnetic tracks, however, are by no means confined to non-theatrical films. Cinerama uses magnetic tracks, and the extreme excellence of its sound is attributable in part to that fact. Regardless of whether or not tracks of such quality could be created by optical methods, they would not keep their quality, for scratches and dirt would mar it, while magnetic records are substantially immune to these impairments.

Magnetic tracks also are, and have been for years, used in studios throughout many of the phases of recording and editing sound pictures. Translation into an optical record for release to the theatre may be one of the final steps in production. Until 1952, however, magnetic sound had not been commonly used in projection.

Long Distance TV

On page 10 of the June issue is a Bell Laboratories report of the findings of their scientists who had been investigating transmission of TV carrier waves beyond the horizon and discovered it can be done. Their "experiments have indicated that the very high and super-high radio frequencies, such as those used for television, radar, and microwave relay systems (microwave relay systems also are used in TV networks) are not necessarily limited to approximately line of sight distances, but that signals can consistently be obtained at distances of 200 miles or more beyond the horizon."

The key word in the above statement is *consistently*. So-called "freak" transmission of these frequencies over great distances is far from new. What these investigators reported in 1952 is that the long-known "freaks" can be reduced to reliable performance. They found that while considerable power is needed to punch through the horizon distance, once that has been done the signal strength beyond the horizon decreased very much more slowly than had been expected.

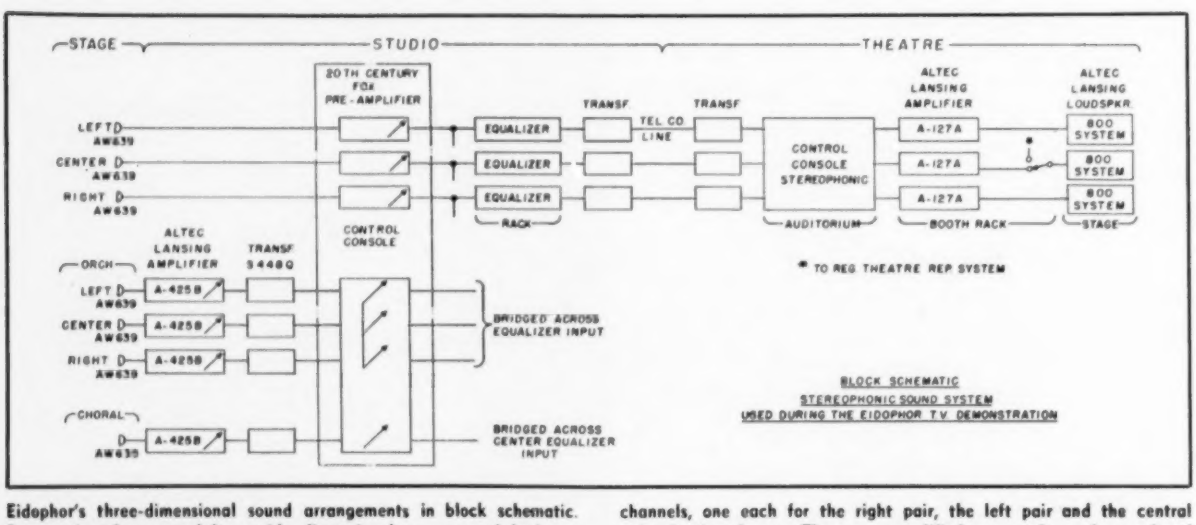
Using frequencies between 459 mc and 3700 mc, the investigators found consistent transmission practicable, and directional antennas effective at distances up to 325 miles, when using powers ranging between 1 and 300 kw. The implications of these discoveries, from the point of view of making TV programs available to remote theatres is self-evident.

Full-Color Large-Screen TV

Eidophor fills a full-size theatre screen with a TV image in natural color, free of visible scanning lines, and brilliant with the intensity of a carbon-arc light source. "The image was of such quality that it was mistaken by some observers for a Technicolor film." (July, page 30.)

The principle of action differs from that of all other television systems in the way the image is produced. In other systems, including common home-type equipment, the television signal is reproduced in the form of a fluctuating, sweeping beam of electrons which bombards a screen of fluorescent material. This screen produces the picture accordingly.

In Eidophor, a comparable beam bom-



Eidophor's three-dimensional sound arrangements in block schematic. Seven microphones at left provide dimensional coverage of both orchestra and stage, plus non-dimensional coverage of choral group. Outputs are mixed in the control console to constitute three audio channels, one each for the right pair, the left pair and the central pair of microphones. These are amplified separately, and reproduced through three separate and appropriately located loudspeakers. The resulting binaural and stereoscopic sound adds immensely to realism.

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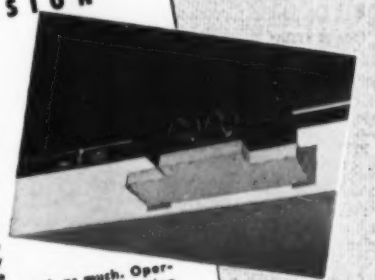

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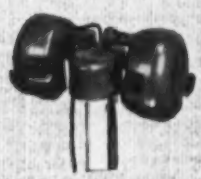

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RCA mobile TV projector that showed the world's first *drive-in* TV show at the S-3 Drive-In Theatre on route S-3 in New Jersey. Width of the TV image (36 feet) and length of TV throw (125 feet) were also world records—and so perhaps was the gross: $16,000 for one evening.

bards a film of oily material, which wrinkles and ripples in response. Arc light, shining through this surface, either continues along its previous path or is diffracted by the ripples, and in this way an arc-lit image is produced on the theatre screen. The CBS field-sequential system (each successive half-frame seen in a different color as a color-wheel revolves) completes the presentation.

Eidophor was accompanied by stereophonic sound (September, page 11)—not previously heard in a theatre since Walt Disney presented his Fantasia back in 1940. There were three separate sound systems, complete with three sets of speakers spacially distributed in the auditorium, to produce the realism of sound coming from different directions and (sometimes) from a moving source. Cinerama also utilizes stereosound. Natural Vision (for the present, at least) does not.

Cinerama

IP's report on Cinerama was presented in the issue for October, page 14; followed by excerpts from comments of non-technically minded New York theatre critics in December, page 17. From the point of view of craftsmanship, Cinerama can hardly be described otherwise than as a projectionist's nightmare. "Straight lines come out bent; imperfect merging of the frames makes skyscrapers jig and mountains dance; viewing keystone in the side seats is monstrous," reported IP in October.

But—". . . they buy out the box-office at advanced prices, applaud thunderously, and tell each other it's wonderful." They also tell all their relatives and friends it's wonderful, with the result that the New York showing is sold out months in advance, and showings in other cities are planned.

Technical improvements are forecast; friends of Cinerama say (December, page 17) that the highly visible vertical unsteadiness of the projected image is due more to camera jump than projector jump, and that new cameras are being built.

Drive-In TV

The October issue of IP, which reported the first public showing of Cinerama, also reported (page 12) the first public showing of TV on a drive-in screen, and the largest TV image ever created. The image was 36 feet wide, and it had the longest TV throw on record — 125 feet! Equipment was RCA's; and the gross at the drive-in that night was $16,000 at $10 per car. The theatre was the S-3 Drive-In, located on Route S-3 in New Jersey. It was only one of a number of theatres that displayed the Marciano-Walcott boxing match on September 23, 1952. Total gross for that one evening by the 50 theatres carrying the event, was reported at $400,000, or an average of $8,000 per theatre per evening for a television spectacle.

Transistor

The transistor as a subject for laboratory investigation is several years old, but 1952 is the year in which it first went into commercial operation (December, page 35), and in which its wide versatility of commercial possibilities was first demonstrated in actual, usable prototypes of commercial equipment. (To be reported in next month's issue).

The general nature of the transistor and the general theory of its performance were set forth in November, page 12. It is an amplifying, oscillating device capable of replacing the vacuum tube in many applications and without need for a vacuum. In physical appearance and essence it is a mere slug of material to which three wires are attached—input, output, and common. The material is germanium metal but not homogeneous throughout; different portions of it have been differently treated to make the ends electrically positive and the center section electrically negative, or vice versa.

It is very small, very light, compared with a vacuum tube, and needs in the order of only 1/1,000,000th as much operating power to perform the same work. The year 1952 is the one in which this device was first put into routine commercial operation.

December's Babies

December's issue of IP announces no less than three innovations.

One is the Synchro-screen for large

(*Continued on page* 32)

Panoramic screen used for Cinerama in the Broadway Theatre, New York City. The screen measures 78 feet around the curve, 51 feet straight across the curve from end to end, and has a height of 26 feet. Three projectors, their light-beams crossing, are needed to put the Cinerama show on this screen.

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Photo by Underwood & Underwood

Color Television Simplified by New Paramount Tube

EXCITEMENT surged through Paramount Pictures headquarters, N. Y. C., this month, as the Lawrence-Paramount picture tube for ultra-simplified color-TV was demonstrated to company executives, to important visitors (some of them from overseas), and to representatives of financial firms. A New York brokerage house issued a bulletin of strong praise for the new color tube.

The tube is based on an idea originated by Dr. Ernest O. Lawrence, Nobel-prize winning California physicist, from whom Paramount acquired the rights. It represents possibly the simplest of all methods of producing TV images in full color.

At present, since color TV entertainment is not being broadcast, the tube is being used in industrial full-color video; but Paramount is also looking forward to its use in full-color, large-screen direct projection theatre television.

Tube Design

Structurally and electrically the new color tube is very similar to conventional black-and-white picture tubes. The only significant differences are those diagrammed in Figure 1, which shows a section of the phosphor screen, and a special grid of wires located in the path of the electron beam.

In an ordinary black-and-white picture tube a beam of electrons scans a fluorescent surface, which emits white light in proportion to the strength of the bombardment at each point. As the beam sweeps across the surface, flies back "dark," and sweeps another line a little lower down, the entire surface of the fluorescent material is scanned in 1/30th second. Since each point on that surface glows white at an intensity proportionate to the fluctuating power of the electron beam, a black-and-white image is created.

In interlaced scanning, as commonly used, each frame is created by a double-scanning; first lines 1, 3, 5, *etc.*, to the bottom of the screen; then the beam flies back "dark" to the top and repeats the process, lacing in lines 2, 4, 6, *etc.* Each half-scan, consisting of either all the even lines, or all the odd lines, is called a "field." In conventional TV there are 30 frames, and, therefore, 60 fields, per second.

In the new Paramount tube the fluorescent surface is composed of three phosphors, one each for red, blue, and green. That is, these phosphors are different materials, which glow in different colors under electronic bombardment. Figure 1 identifies the red and the blue strips; the alternate strips between red and blue are the green. This three-color phosphor surface is one of the two significant ways in which the Paramount tube differs from ordinary black-and-white tubes.

The second difference is also shown in Figure 1. It consists in a grid of wires positioned in the path of the beam, behind the fluorescent surface. There is one wire behind each red strip; and another behind each blue strip. There is no grid wire behind any of the green strips of the phosphor.

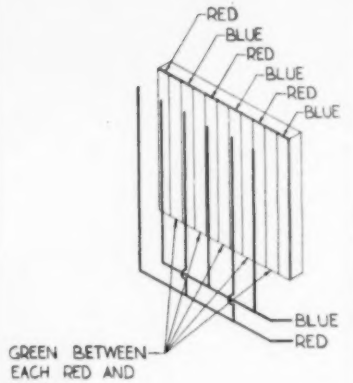

FIG. 1. Special features of the new Paramount picture tube for electronic color TV are diagrammed here. In a conventional picture tube the fluorescent surface, on which the image appears, is coated throughout with a single fluorescent composition; the same surface of the Paramount tube is coated with alternate strips of three different materials, which glow in three different colors. Behind each red and blue strip (but not behind green ones) is a grid wire not found in conventional tubes.

All the "red" wires are electrically connected together in parallel, forming a "red" grid; and similarly the "blue" wires are electrically paralleled to form a "blue" grid. "Red" and "blue" grids are not connected to each other; to the contrary, a potential difference of about 15,000 volts is applied between them.

Principle of Operation

The television camera utilizes a color wheel. Alternate fields are taken through red, blue, and green gelatine filters. Operation at the receiving end is completely electronic, and may be either in full color or black-and-white, according to the nature of the received signal.

If the transmission is in color, through a TV camera equipped as above, the signal is accompanied by color information which alters the state of charge of the "red" and "blue" grid wires. As this charge varies the electron beam is deflected one way to activate the "red"

(*Continued on page* 31)

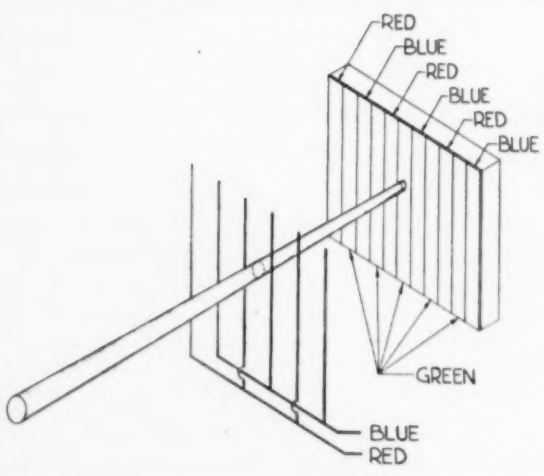

FIG. 2. Beam of electrons is here shown impinging upon and exciting to a green glow one of the alternate strips of the color tube fluorescent surface. During color TV, intensity of electron beam varies in each field according to color values. During black-and-white transmission this variation does not exist, balanced color intensities produce black-and-white image.

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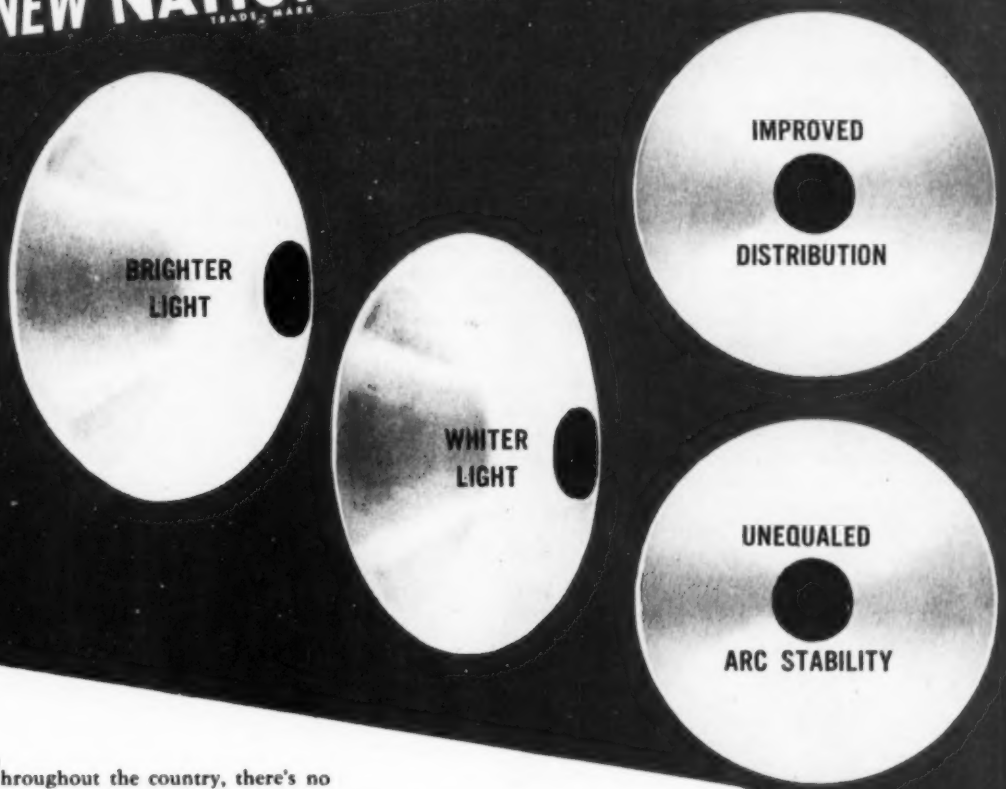

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Types of Theatre Sound Reproducers

This is the first of a series of articles analyzing the essential nature of devices that convert sound records into electrical currents. Two general types of these devices, the disk reproducer and the soundhead, are used in theatres at present, while the magnetic reproducer is growing increasingly popular for 16-mm projection.

By ROBERT A. MITCHELL

I. The Sound-on-Disk Reproducer

THE term "sound reproducer" includes a wide variety of apparatus for transferring or re-creating auditory stimuli. A public-address system to which a microphone is connected, for example, constitutes a sound-reproducing system. In general, however, we think of apparatus in which *sound records* are played as reproducers, and consider these apart from the electrical amplifiers and speaker systems through which they work. Thus we have reproducers for the several types of phonograph records, for photographic soundtracks on motion picture film, for steel-wire and magnetic-tape recordings, *etc.*

The theatre projectionist is ordinarily concerned only with two special types of sound reproducer, namely, sound-on-disk and sound-on-film. Although *synchronized* sound-on-disk has not been used in motion-picture projection these many years, heaven be praised, *non-synchronous* disk reproduction is an important item in well-run theatres for providing the necessary music before the shows and during intermissions.

The terms "synchronous" and "non-synchronous" applied to disk reproduction refer, of course, to whether the phonograph record runs in exact step with the film. In the early days of sound pictures, large disk records, played on a turntable attached to the projector, furnished the sound. Projectionists who operated in the days of "Vitaphone" recall sound-on-disk with horror. When repairing prints it was absolutely necessary to replace every discarded inch of film with an equal length of black film in order to keep the picture and sound "in synch."

It was also necessary to thread up with a "start" frame in the aperture and with the phonograph needle resting on that point of the first record groove marked by an arrow. But even with every precaution taken, it sometimes happened that the record got very badly "out of synch." The writer remembers one case where an actor kept on talking after he had been killed, pronounced dead, and buried.

Magnetic-tape reproduction is widely used in 16-mm projection, partly as a substitute for, and partly in conjunction with, regular photographic soundtracks. At the present time magnetic tracks are used in the 35-mm field only for recording purposes, although their high fidelity and low noise-level may recommend them for theatre use when stereophonic (multidirectional) sound, which involves the simultaneous playing of three or more soundtracks, becomes standardized. (*Cinerama uses magnetic-track sound.—Ed. Note.*)

Quality of the Sound

"High fidelity" is a term descriptive of the qualitative efficiency of any sound recorder, reproducer, or record. Distortion is the enemy of high fidelity. When sound invaded the motion-picture industry in 1928, killing the art of the "silent drama" by giving birth to a strange new audio-visual art compounded of basic movie techniques and the talkative art of the stage, sound distortion was a severe handicap.

The early "talking pictures" hissed and snapped during intervals of intended silence because "noiseless" recording was not then in use. Music sounded thin, fluttery, and unnaturally "tinny" because of imperfections in the recording and reproducing apparatus. Speech was often garbled and difficult to understand because of distortion.

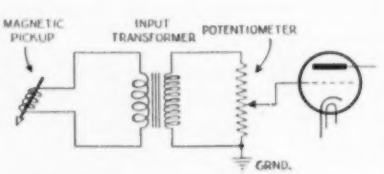


FIG. 1. Circuit diagram showing connection of magnetic phono reproducer to amplifier. Function of the input transformer is to match the impedance of the reproducer to that of the amplifier circuit. Action of the magnetic pickup is commonly based on vibratory changes in the magnetic flux path produced by vibration of the needle as it follows the groove of the record. Vibratory changes in flux strength induce a corresponding voltage in the pickup coil. Impedance match between pickup coil and transformer input coil assures maximum transfer of energy from pickup to transformer.

Modern movie sound is nearly free from objectionable distortion when reproduced from the best sound-on-film records on the best equipment under the best conditions. In fact, all distortion having its origin in amplifying units (with the sole exception of a troublesome kind of distortion called "intermodulation") is kept under 2 per cent of the total power output in present-day equipment of good manufacture. Improperly installed speaker units and poorly adjusted soundhead components, however, may cause distortion even when new and mechanically and electrically in good condition.

The sound equipment in most theatres, unfortunately, is far from being new or free from wear and maladjustment. And all too often exhibitors practise the false economy of "modernizing" outmoded sound systems. Obsolete sound systems cannot be built over to equal the excellent performance characterizing all of the more modern ones.

It should be clear to everyone in the exhibition business that the reproducers, amplifiers, and speakers that represent earlier efforts in the sound-picture field cannot perform in a satisfactory manner no matter how they are "pepped up" by adding a few new units. The defects of obsolete soundheads, for example, are often made *more* evident by improving the frequency range of the speaker units. And electrical distortion produced by old-style amplifiers may be magnified in the same proportion as the signal when additional power stages are used.

As every projectionist knows, mechanical factors can cause sound distortion as readily as do such electrical factors as faulty vacuum tubes, amplifier overload, *etc.* In fact, sound engineers are deeply concerned with the mechanical limitations of recording and reproduction.

In the case of sound-on-disk, the physical wiggling of a cutting stylus pro-

duces a wavy groove in the master disk which, in turn, is used in purely mechanical processes for stamping the commercial records.

Mechanical factors that can introduce distortion are unavoidably present in the sound reproduction process. Both the phonograph record and the soundfilm print must be moved at a constant speed the same as that used in recording; and the slightest deviation from standard constant speed will prove ruinous to the quality of the sound. These considerations demand the most careful construction of all parts of any sound reproducing apparatus.

Features of Disk Recordings

The phonograph reproducer, though much simpler and less expensive than a film soundhead, necessarily involves a moving component—the vibrating stylus and electrical generating unit of the pick-up—which has no counterpart in either sound-on-film or magnetic-tape reproducers. This is one of several reasons why film and tape recordings are capable of giving a more faithful facsimile of the original sound than any type of phonograph record. Another reason is that film and tape recordings can be made practically noiseless, whereas the stylus, or needle, of a phonograph pick-up is necessarily subjected to the mechanical friction of the moving record-groove at all times.

Even though disk records are now made of smoother materials than formerly, materials having a lower surface-noise level, they still "hiss" noticeably during moments of intended silence when a fairly wide frequency band (50 to 8,000 cycles per second) is amplified and reproduced by the speakers. Record hiss can be reduced by eliminating all sound above 3,000 or 4,000 cps, but this expedient results in muffled, "boomy" sound which imparts to voices a thunderous, drum-like quality.

An additional reason why sound-on-disk is inferior to sound-on-film and magnetic tape is the undesirable compliance of lightweight pickups. When high-frequency sounds are being reproduced, the pickup works very well because only the needle is caused to vibrate by the wavy groove. But when sounds of very low frequency are present in the record, not only the needle, but the entire pickup, wiggles. This distorts the wave-form of the sound, giving it an unnatural quality; and when high and low frequencies are being reproduced simultaneously, a serious type of distortion known as "intermodulation" is mechanically produced. When we hear it we think that we need a new needle or a new tube in the amplifier, when actually, unwanted vibration of the whole pickup is responsible for making the sound blurry and raspy.

For perfect sound reproduction we should require a system having a "flat" response throughout the entire frequency-range detectable by the human hearing apparatus, to wit, from about 15 to 30,000 cps. This is a bit beyond the capacity of even a good sound-on-film reproducer, for photocell response, when a 0.00125-inch scanning slit is used, cuts off to nothing at 14,400 cps.

Moreover, amplifier and speaker design, being what they are, cut off in the 8,000 to 10,000 cps. range. This is no great handicap for the reproduction of most sounds, but it makes impossible satisfactory reproduction of the tinkling of shattering glass, the hard brilliance of the triangle in orchestral music, the scrunch of gravel trod upon, the rustle of dried leaves, the crystalline clank of metal, the soprano scream of rushing wind, and a thousand and one other subtle "transient" sounds heard in real life by all whose hearing is in good order.

Sound-on-disk is no better off in this respect. Even though 10,000 cps can be recorded on both 78 rpm and 33 1/3 rpm disks, the ability of a slightly worn needle to follow faithfully the microscopic waverings of the record groove is very poor indeed. Poorer still is the ability of the record itself to preserve its tiny 10,000-cycle waves from the erasing action of the needle, which scuffs them rather roughly.

Nature of the Problem

Earthquakes, thunderstorms, explosions, rumbling trains, and many other common sources of sound produce vibrations lower than theatre sound systems can handle. Large pipe organs have a pipe that gives a 16-cycle tone when played. This is almost below the range of normal audibility; but the tone is so powerful that it can be felt as something vibrant in the air, something that comes up through the floor and gives one a good shaking from head to foot. This is a sound effect that could not be duplicated in sound reproduction even if the speakers had tremendous capacity. Output power of the order of several hundred watts would be required to simulate it even mildly.

Every projectionist should familiarize himself with the sounds which occur in the bass, tenor, alto, and soprano frequency bands. The very lowest sounds, of course, belong to the bass region. Using the piano as a demonstration apparatus, the bass extends from the lowest note (an "A" vibrating 26.667 times per second) to the "E" which is 12 white keys below "Middle C." This "E" has a fundamental frequency of 80 cps.

Tenor extends from the aforementioned "E" to "C" an octave above "Middle C." Alto takes in the next octave or so; and all the rest of the keys, up to the end of the keyboard (a "C" vibrating 4,096 times a second) may be considered as soprano. These are not musical definitions of bass, tenor, etc.—they are arbitrary definitions which help us locate various sounds on the piano keyboard as a kind of "reference."

It can be appreciated that our sound reproduction systems, especially sound-on-disk, fail at both ends of this piano "sound spectrum." In fact, the highest tones that our theatre sound-systems are capable of reproducing clearly (about 8,000 cps) are only one octave above the highest note on the piano keyboard.

But a piano sounds only like a piano, and not like the neighbor's boy practising on his cornet. Neither does the lowest "A" on the piano have the deep, penetrating quality of *the same "A"* in the closed diapason register of the organ, even though both vibrate 26.667 times each second.

In what lies the difference? When we strike the lowest note on the piano keyboard we actually hear only a pattern of several higher sounds *repeating themselves* 26.667 times every second. The true *fundamental tone* of this frequency is rather weak on the piano; though it is stronger in a big concert grand than it is in Aunt Emma's second-hand upright. If we sound the same "A" on the organ, using a single stop marked "closed diapason," "flute celestes," or some other kind of flute, we hear only the fundamental tone of 26.667 cps, for closed pipes produce very few harmonics with the fundamental.

Pure Tones and Harmonics

All this, which seems very academic, can help us judge the capabilities of sound reproducers. We have all heard piano music on both disk and film; we are certain that we have many times heard some very low notes sounded; and we are of the opinion that they sounded very realistic indeed.

Well, then, let us assume that in one

(*Continued on page* 33)

Movies High Hat Now

Grand Opera toured the country via the projection room on December 11 when *Carmen*, played on the stage of the Metropolitan Opera House in New York City, was televised to 31 theatres from coast-to-coast and exhibited via large-screen TV. Admissions ranged up to $7.20 a seat. The Gopher Theatre in Minneapolis ran out a red carpet on the front sidewalk and uniformed its ushers in tuxedos. The Telenews Theatre in San Francisco served free cocktails during the intermissions. Out-of-town "opera-goers" had a more intimate contact with the entertainment than did patrons at the Metropolitan itself, since no seat in the great house yields a close-up view that can be compared to the TV camera's.

IN THE
SPOTLIGHT

ONE of the practical, paying advantages of high competence in craftsmanship was exemplified for us in the case of Ed Priban and Henry Feigenbaum of Local 110, Chicago, who were most welcome visitors to IP's offices this year-end. Priban and Feigenbaum were assigned by their Local, some time back, to stereo-project three-dimensional stills for International Harvester Company, in connection with an advertising and sales campaign. So pleased was the International Harvester management with the work of these men that when the company decided to take its stereo show to New York this year-end, Messrs. Priban and Feigenbaum were re-engaged and enjoyed an all-expense-paid trip to New York, plus, of course, union wages. All because they had given an employer reason to feel confidence in their skill.

• A recent issue of *Labor News*, a weekly published by the Rochester, (N.Y.) Central Trades & Labor Council, AFL, carried an interesting article describing the trials and tribulations of Rochester Local 253 in the early days of its existence. According to this report, the first meetings of the small group of projectionists who were determined to affiliate with the IA were held in secret, for at that time, back in 1912, labor unions were held more or less in disfavor and very often men suspected of union sympathies found themselves among the unemployed.

Local 253 received its charter on July 15, 1912, and Roy J. Fisher was elected its first president. Fisher, incidentally is one of the few remaining charter members of the Local and is head of the Fisher Mfg. Company, manufacturers of the well-known Ethyloid film cement. Three of the remaining charter members still hold office in the Local: Leon E. Burton, who has served as treasurer for the past 34 years; Floyd B. Spencer, secretary for 25 years, and Fred E. Boekhout, business representative for the past 17 years.

Due to the persistent efforts of Local 253, the state licensing law was made effective in Rochester, and today two members of the Local serve on the City Examining Board. As told to a *Labor News* reporter, Floyd Spencer stated, "Many changes have been made in projection since the days of the nickelodeon with one hand-operated machine. Sound pictures, with their complicated amplification equipment were mastered by our members. Now television and other great changes are in the offing . . . our men are preparing to meet these advances in projection with the same courage and success as in the past."

• Cinerama is on the "must" list for many out-of-town IA men visiting New York. Jim Sipe, Luther Thompson, and Harold O'Donnell, members of Pittsburgh Local 171, made the trip recently to get a first-hand report on the process.

• We were glad to learn that William H. Hartnett, business representative for Local 257, Ottawa, Ont., Canada, is recuperating successfully following recent surgery.

• St. Louis has been chosen as the site of the 1953 AFL convention. The date is September 21, and the meetings will be held at the Hotel Jefferson.

• A record turnout marked the recent 40th anniversary celebration of Local 488, Harrisburg, Penna. Public and labor officials from all over the nation were present at the affair, which was considered to be one of the most outstanding labor events of the year. City Councilman Harry O. Dayhoff, pinch-hitting for Mayor Claude Robins, who was indisposed, welcomed the guests. IA President Walsh and General Secretary-Treasurer William P. Raoul were among the speakers of the evening.

Among the many labor notables present were Alan Kline, president of the Central Labor Union; James L. McDevitt and Earl C. Bohr, president and secretary-treasurer, respectively, of the Penna. Federation of Labor, and Michael Johnson, district manager of the ILGWU Local 108.

Serving on the banquet committee were Sam Rubin, Richard Bennett, Paul Paterson, Charles J. Jones, John Bruner, Clarence Rudy, and Lawrence J. Katz.

• W. Martin Lipscomb, business representative of Local 400, Alexandria, La., was elected vice-president of the new chapter of the United Cerebral Palsy Association recently organized in Louisiana. This chapter, the second in the state, is located in Alexandria and the members of Local 400 have pledged themselves to cooperate to the fullest in the good work being done by that worthy organization.

• John Stanton, projectionist at the Louisa Theatre, Carnegie, Penna., was credited by Carnegie Fire Chief M. F. Schulte with averting a panic during a quick-spreading fire which destroyed the building occupied by the theatre. About 200 patrons, most of whom were children, were attending a matinee when Stanton discovered smoke curling from the ceiling. He immediately stopped his projection machine, turned on the lights and calmly assured the audience that although

HARRISBURG, PENNA. LOCAL 488 CELEBRATES ITS FORTIETH ANNIVERSARY

Shown here are members and guests attending Local 488's 40th anniversary celebration held on December 12 in the ballroom of the Penn-Harris Hotel in Harrisburg. Present at the banquet were top ranking IA officials and many prominent public figures. Six of the original charter members of the Local—Lawrence J. Katz, Sam Rubin, Harry N. Michaels, Harry Smith, Frank Creme, and Elmer Z. Yost—were on hand to receive special honors. IA President Walsh made the presentations on behalf of the Local, and lauded the men for their splendid efforts down through the years.

there was no immediate cause for alarm, suggested that they walk out quickly and quietly. The fire completely destroyed the building, causing an estimated damage of more than $150,000. It was only the cool-headedness and quick thinking of the projectionist that prevented what might have been a disaster.

• A joint announcement by Roy Brewer, IA representative, and Charles Boren, in charge of industrial relations for the Ass'n of Motion Picture Producers, revealed that both major and independent producers recently agreed to a health and welfare plan covering all IA West Coast Studio Locals. Among the benefits included in this plan are: group life insurance, accidental death and dismemberment, surgical, medical, and hospitalization payments.

• Damage estimated to be several thousands of dollars was caused by a fire that broke out in the projection room of the Grand Theatre in Denver, Colo. Film in one of the projectors ignited and the flames quickly spread to the second projector before they could be brought under control.

• A threatened strike was averted when Akron Local 364 and the exhibitors signed new three-year wage pacts.

• Cooperation between theatre owners and IA Local 101, Sharon, Penna., in opposing a proposed 10% amusement levy in the township of Hickory and in other nearby communities, resulted in the withdrawal of the measure by the township supervisors. Local 101 ran a special advertisement in the Sharon *Herald* informing the readers of the proposed tax and urged that they attend a scheduled meeting of the supervisors in protest against what the Local termed an "excessive and discriminatory tax." So much interest was stirred up and so vigorous was the opposition to the proposed levy that the whole idea was junked and now the powers-that-be must look around for other means of added revenue.

Local 101 officials, Laurence I. Boyd, secretary, and J. M. Burke, business representative, are to be commended for their untiring efforts in helping to defeat the proposal.

• The next New York State Union Label Trades convention will be held in Binghamton, N. Y., early in May.

• The recent purchase of an additional $100,000 worth of the U.S. Defense Bonds by Chicago Local 110 increased the Local's total U. S. bond investment to $376,000. Eugene Atkinson, business manager, declared that this purchase was an expression of the Local's appreciation of President-elect Eisenhower's appointment of Martin Durkin as U. S. secretary of Labor, and of the recent election of George Meany as president of the AFL, succeeding the late William Green.

"We have no better way to express our appreciation to the President-elect," said Atkinson. "His act in choosing Durkin was done with understanding and courage, and was completely divorced from partisan politics. . . . George Meany was also a happy choice as AFL chief. He will be a great contributing factor in the cementing of good labor-management relations."

• Thirteen IA Locals now have membership in the newly organized Eastern Motion Picture Council, a counterpart of the Hollywood AFL Film Council. Eastern Council covers the Greater New York area and has been expanded to take in Local 650, Westchester County; 640, Nassau and Suffolk Counties, and 642, Bergen County (N. J.).

• According to reports in the trade press, many IA Locals throughout the country are giving considerable thought to the expanded use of large-screen TV and to the possible benefits that projectionists may derive from the increased admission prices to these telecasts.

Many Locals contend that when the box-office price is increased to equal that of the point of origin of the telecast, then projectionists are entitled to a hike in pay. A case in point is the recent large-screen nation-wide Metropolitan Opera House telecast of "Carmen," when the top admission price asked by the Theatre Guild in New York was $7.20. It is very probable that future contracts between IA Locals and theatre telecasters will include provisions covering such events.

• A barbeque and dance marked the recent 41st anniversary celebration of Local 222, Shreveport, La.

• Carl Lasker, member of Chicago Local 110, is a patient at the U. S. Veterans Administration Hospital, Madison, Wisconsin, where he is undergoing extensive treatments. He expects to be confined there for quite a spell and would appreciate hearing from brother members in the IA. He may be addressed in care of the hospital.

IA ELECTIONS

LOCAL 150, LOS ANGELES, CALIF.

John Maynard, *pres.*; E. L. Robbins, *vice-pres.*; Charles Vencill, *sec.-treas.*; George Schaffer, *bus. rep.*; Paul Mahoney, *ass't bus. rep.*

LOCAL 173, TORONTO, CANADA

James Sturgess, *pres.*; Arthur Kerrin, *vice-pres.*; George H. Jones, *sec.-treas.*; R. C. Higgins, *rec.-sec.*; Arthur Milligan, *bus. rep.*; Norman Tanner, Jack Hills, Roy O'Connor, L. Applebaum, *exec. board*; T. Covert, J. Harris, Jr.; L. Clarke, *board of trustees*; Solly Cohen, *sgt.-at-arms*; George Robinson, *tyler.*

LOCAL 181, BALTIMORE, MD.

Louis P. Sieber, *pres.*; Wilbur C. George, *1st vice-pres.*; Hal Braswell, *2nd vice-pres.*; Edward T. Eich, *3rd vice-pres.*; Chester L. Towers, *rec.-sec.*; Thomas P. Finn, Sr., *fin.-sec.*; Carroll G. Bayne, *bus. rep.*; Charles J. Grauling, William R. Lange, Jr., Arthur N. Eich, *trustees*; Charles Spellman, Ned Isbeck, *wage scale comm.*; Elmer Kastner, *sgt.-at-arms.*

LOCAL 222, SHREVEPORT, LA.

H. Eaton, *pres.*; Cecil Parker, Sr., *vice-pres.*; Frank Gwin, *sec.-treas.*; N. S. Laird, *bus. rep.*; Earl Laird, *sgt.-at-arms.*

LOCAL 307, PHILADELPHIA, PENNA.

Harry J. Abbott, *pres.*; Abbott Oliver, *vice-pres.*; Alexander Fell, *rec.-sec.*; Charles Humphries, *fin.-sec.*; Horace Johns, *bus. rep.*; Ben Green, Parker Kennedy, Al Van Bell, Robert Block, *exec. board*; Abe Sherman, Al Werlin, William Braunewell, *trustees*, Albert Winkler, *sgt.-at-arms.*

How to Swindle a Bank

How to swindle your bank and get away with it is explained in detail by so reputable and honorable an authority as Eastman Kodak Company. One reason Eastman reveals the secret is because it won't work any more.

But it did work fine. Man wrote a check to cash for $1,500, handed it in to the teller. When the cancelled check came back to him with his balance statement he tore it up, complained his balance was $1,500 short. The bank had no valid proof that a check of that amount had ever existed, and was forced to "make good."

Mr. George L. McCarthy, who retired on January 1st from the presidency of Recordak Corporation to become chairman of its board, is the reason the trick won't work any more, Eastman Kodak reveals. The $1,500 check referred to was one of many such swindles "put over" on him while he was a vice-president of Empire Trust Company in New York. It got to be a wide-spread racket in the 1920's.

McCarthy invented the idea of microfilming every check before returning it to the writer. With limited personal funds he built ten microfilm machines and displayed them at a convention of the American Bankers Association. Eastman Kodak became interested and organized Recordak Corporation as a subsidiary under McCarthy's guidance. And at the present time, when Mr. McCarthy changes position from president to board chairman, Eastman reveals the story.

Measuring Sound Absorption*

By EARLE JONES, SEYMOUR EDELMAN and ALBERT LONDON

A method has been developed for measuring sound absorption of acoustic materials that have been installed. It is useful for determining the effects of aging, staining and re-decoration. It is also useful for acceptance testing, since large variations in sound absorption are ascribed to faulty application. Measurements are made without defacing surfaces; the test is non-destructive.

LABORATORY samples of acoustic plasters usually yield repeatable results even when tested by different laboratories. However, when the materials are installed the sound absorption coefficients depend to a large degree on such factors as the care devoted to the mixing of the ingredients, the skill of the plasterer, and the conditions under which the plaster is cured. (Acoustic tiles also, even though from the same group, may vary materially in individual sound absorption coefficients.)

The problem of maintenance of acoustic material installations is of great economic importance. When this material becomes soiled or otherwise unsightly with the passage of time, the choice of a poor method to restore its appearance may result in the loss of its sound absorption. In experimenting with various methods of re-decoration, it is advantageous to make sound absorption field measurements of a small portion of the material before and after using a particular method of re-decoration.

Test Equipment

The "long-tube method" described in this paper makes it possible to measure the sound absorption coefficient of acoustic materials that have been installed without defacing them. It consists of setting up a standing wave pattern within a tube, one end of which is closed by the acoustic material being tested; and, from measurements of the maximum and minimum pressures in the standing wave pattern, computing that random incidence absorption coefficient corresponding to the value which would be determined by a reverberation-room test. Table 1 was prepared giving the reverberant sound-absorption coefficients for values usually found in testing acoustic materials.

In designing the test tube, 512 cycles per second was chosen as the operating frequency because it is the one used in reverberation testing and is near the mean of the frequencies used in absorption testing. It was decided that the tube should be made of ⅛-inch brass tubing, 9¾ inches in diameter and about 30 inches long. The sound source is a 6-inch permanent magnet speaker mounted on a brass plate covering the back of the tube.

Inside the tube two parallel bars run along its length and are bridged by a center bar to form an H-shaped unit. The center bar of the H can be moved along the length of the tube by means of a steel pipe and a steel rod which pass through a close-fitting bearing in the back cover of the tube. The pipe is for coarse adjustment of the position of the center bar of the H; and the rod, which is threaded inside the pipe, for fine or micrometer positioning.

A microphone is mounted on the H cross member. Several types of microphones were tried. The most successful was a hearing-aid-type crystal microphone. After much experimentation it was found that a caulking-compound gasket would temporarily bond the tube to the material being tested without damaging the material and without too much leakage of sound.

Operation of the Equipment

Figure 1 is a block diagram of the set-up. The signal from an oscillator drives the loudspeaker. The resulting microphone signal is amplified, filtered to remove the effects of extraneous sound and harmonics, and read on a sensitive vacuum-tube voltmeter having an accurate decibel scale.

The field procedure used in determining the sound-absorption coefficient by means of the long-tube method is made clear in the following description of a test made on a ceiling. When mounted on its casters, the top of the tube in the vertical position can be adjusted to any height between 5-feet 2-inches to 5-feet 10-inches. The tube is mounted on a scaffold and its jackscrew run up until its top just touches the ceiling, care being taken to see that the end of the tube touches the ceiling evenly. The caulking-compound gasket is then slipped up and pressed against the ceiling to make a firm seal.

The oscillator is tuned to 512 cps by comparison with a tuning fork. The mi-

(*Continued on page* 30)

TABLE 1.

Absorption coefficients for all values of delta db between 0 and 59.

db	0	1	2	3	4	5	6	7	8	9
0	0.77	0.80	0.82	0.84	0.85	0.86	0.86	0.86	0.86	0.85
10	.84	.83	.81	.79	.77	.74	.71	.69	.66	.63
20	.60	.56	.53	.50	.48	.45	.42	.39	.37	.34
30	.32	.30	.27	.25	.24	.22	.20	.19	.17	.16
40	.14	.13	.12	.11	.10	.09	.09	.08	.07	.07
50	.06	.05	.05	.05	.04	.04	.03	.03	.03	.03

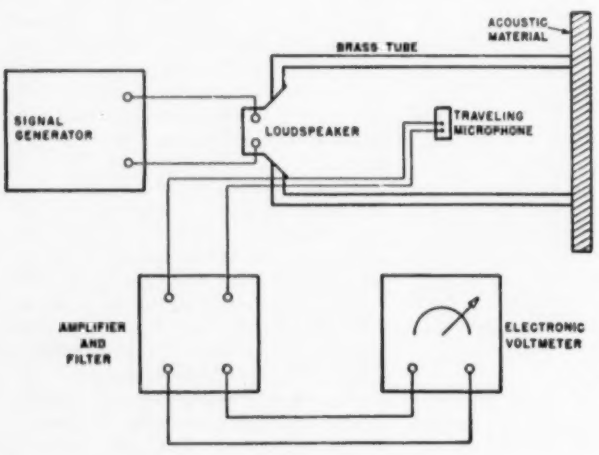


FIGURE 1.

Block diagram of tube and associated equipment as used in field measurements of sound absorption.

* Cond. from National Bureau of Standards Research Paper 2339, July 1952.

16-mm

BECAUSE EXPANSION OF 16-mm ACTIVITY PROVIDES INCREASING FIELDS OF EMPLOYMENT FOR SKILLED PROFESSIONAL PROJECTIONISTS IN TV STUDIO AND NON-THEATRICAL SHOWINGS, AS WELL AS ENHANCED POSSIBILITIES OF PERSONAL BUSINESS VENTURES. THIS 16-mm DEPARTMENT OF IP WILL APPEAR MONTHLY.

Ampro Corporation's Model 477 Magneto-Optical Projector

Sound from magnetic and optical tracks can be reproduced simultaneously, mixed in any proportions of volume desired, on this equipment, which also performs all the functions of 16-mm projector, recorder and p.a. system.

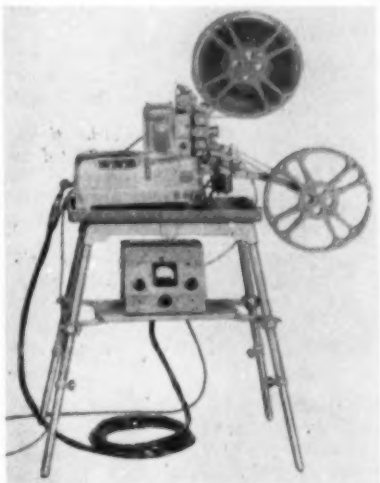
AMPRO Corporation's latest 16-mm projector, the Model 477 pictured here, combines all the functions of 16-mm sound projector, using incandescent illumination, with those of magnetic recorder and public address system. It includes a number of special features, one of which is the ability to reproduce simultaneously mixed sound from both optical and magnetic soundtracks.

Others include mechanical provisions along the film path that minimize possibility of any damage to film in case the celluloid slips out of proper engagement with sprocket teeth. Flexibility of gate, pad and shoe arrangements is such that as a rule film will not be destroyed, nor will the show necessarily be interrupted. To the contrary, it is often possible in such cases to restore the film to proper threading without even stopping the motor.

Provisions have also been included for single-frame projection so that in presenting industrial or educational material the mechanism can be stopped for examination of details.

Model 477 normally operates from a 105-125 volt AC line, 50-60 cycles, 11¼ amperes. It can, however, operate as a silent projector from a DC line; and in addition it can reproduce optical sound when powered by a DC line if a 100-watt DC to AC converter is added. Projection

One of the conveniently located groups of controls of the Ampro Model 477 magneto-optical 16-mm projector and recorder.



Ampro Model 477 16-mm magneto-optical projector is equipped with controls for magnetic recording, and with facilities for mixing half-track optical and magnetic sound in reproduction.

lamps used may be either 750 or 1000 watt and either 10 hour or 25 hour types. Exciter lamps are 4 volt ¾ ampere rating.

For magnetic recording, the equipment is fitted with both volume meter and headset to permit the user to monitor sound being recorded.

The instruction manual goes into very complete detail in matters of operation and maintenance both as a projector and as a recorder.

In projection, the manual indicates, with elaborately lettered or numbered illustrations, how to thread and project film. Routine maintenance instructions—for example, on how to replace an exciter lamp, or how to replace amplifier tubes—are included. In addition, the manual embodies definite information for curing simple troubles. The following is a typical example of trouble symptom and remedy as presented therein: "No sound, ERASE ON lamp will not light—Magnetic sound amplifier fuse has burned out—replace it."

Instructions for use of the equipment as a recording device go much further—far beyond operating details in production techniques. Users are shown, for example, how to prepare a sound cue sheet for timing music and narration to the pictorial matter on the film; or, how to mix magnetic narration with optical music that may already be present for maximum clarity and best dramatic impact.

16-mm Catalogs and Films

University Extension, University of California, announces a new 16-mm, 20-minute sound film titled: SHAKESPEARE'S THEATRE: THE GLOBE PLAYHOUSE; a scholarly reconstruction of the theatre as it is believed to have existed, and of its conventions of stagecraft. A short sequence from J. Arthur Rank's HENRY V has been included. Much of the action, however, is demonstrated by magnetically-animated scale models in a three-dimensional scale reproduction of the theatre.

The Society of Motion Picture and Television Engineers offers a free catalog of 16-mm and 35-mm test films carrying both picture and sound, or only picture or only sound, according to the nature of the test covered. There are 24 such films at present, varying in length from 8-foot loops to 500-foot reels and sold at proportionately varying prices. All are on safety stock.

Progress of modern science from 1851 to 1951 is demonstrated in British Information Services film titled FORWARD A CENTURY. It bridges the period between the opening of the Crystal Palace by Queen Victoria, and the opening of the Festival of Britain by King George VI. Film is 16-mm sound, black-and-white, running 30 minutes, and available either for sale or for rent.

Illinois Central Railroad maintains a library of 16-mm sound films that are offered on a free loan basis and shipped prepaid, costing the borrower nothing except the postage for returning them. These films deal with railroads, courtesy, safety and related topics. Included is a 45-minute historical feature on Kodachrome with RCA optical sound, titled THE SONG OF MID-AMERICA, which reviews the building up of the Mid-West and the part played therein by I.C.R.R.

Local Sources of 16-mm Films

[Continued]

PROJECTIONISTS interested in booking 16-mm films either for their Local Union, or on behalf of any other local group they may be serving or on their own accord, will find in this serialized directory the sources available in their own vicinity.

The data given is reproduced from U. S. government listings. These have been carefully pruned and all local film libraries that cannot serve projectionists have been eliminated. There are policy, business, ownership and contract reasons why some 16-film libraries cannot cooperate with readers of IP. None of those are included below. All listed here should be able to serve the projectionist as an individual, as a member of his Local Union (which is a "civic group"), or as an agent for any group of persons who wish to book 16-mm prints.

Terms on which the film libraries listed here offer their wares must be ascertained by individual inquiry. Some of these libraries have 35-mm and 8-mm prints in addition to 16-mm; this also must be ascertained by direct inquiry.

The directory is arranged alphabetically by states and cities.

CALIFORNIA

ALTURAS

Modoc County Schools
Audio-Visual Education
Approximately 35 films—educational; distribution restricted to Modoc County.

BERKELEY

Farm Credit Administration of Berkeley
Approximately 15 films—on farm credit and cooperatives; distribution restricted to States in Farm Credit District.
U. S. Department of Agriculture Bureau of Entomology and Plant Quarantine
Six films—on white pine blister rust; distribution restricted to far Western States.
University of California Extension
Department of Visual Education
Approximately 3,000 films—educational; distribution restricted to 8 Western States.

BEVERLY HILLS

Beverly Hills Unified Schools
Audio-Visual Department
Approximately 100 films—educational, a few sponsored; distribution restricted to Beverly Hills public schools and civic organizations.
California Commercial Film Co.
One film—on sales training.
Donald Reed Motion Picture Service
Approximately 500 films—entertainment shorts and features.
Simmel-Meservey, Inc.
Approximately 50 films—educational.

BRIDGEPORT

Mono County Schools
Audio-Visual Education
Approximately 60 films—educational; distribution restricted to Mono County.

CARMEL

Carmel Camera Shop
Approximately 150 films—entertainment, educational, and sponsored.

CHICO

Chico City Schools
Audio-Visual Education
Approximately 20 films—entertainment, educational, and sponsored; distribution restricted to Chico.

COMPTON

Evangelistic Audio-Visual Association
Approximately 300 films—entertainment, religious, and sponsored.

EL CENTRO

Imperial County Schools
Audio-Visual Education Service
Approximately 350 films—educational, some sponsored; distribution restricted to Imperial County public schools and civic groups.

FAIRFIELD

Solano County Schools
Audio-Visual Education
Approximately 500 films—educational, some sponsored; distribution restricted to Solano County.

FRESNO

Baptist Book Store
Approximately 200 films—primarily religious; distribution restricted to California.
Supplier's, Inc.
Tiny's Film Service
Approximately 325 films—entertainment and religious.

GLENDALE

Harold C. Ambrosch
Approximately 1,000 films—entertainment, educational, and religious.

HOLLYWOOD

Academy Films
Approximately 15 films—educational.
Bailey Films
Approximately 860 films—entertainment, educational, and sponsored.
Billy Burke Productions
Approximately 70 films—professional medical and dental subjects; distribution restricted to professional groups.
Cinesound Studios
Six films—educational.
Coast Visual Education Co.
Some films, number not reported—entertainment, educational, and religious; distribution restricted to southern California.
Courneya Productions
Approximately 40 films—entertainment shorts and informational.
Family Films, Inc.
Approximately 25 films—entertainment and religious.
Film Classic Exchange
Approximately 1,000 films—entertainment, educational, and religious including old-time movies.
Hack Productions
Six films—informational and religious.
Hansen's Church Films
Approximately 125 films—religious; distribution restricted to western United States.
Hollywood Film Enterprises, Inc.
Approximately 300 films—entertainment shorts and features, educational, and religious.
Leader 16mm Film Library
Approximately 250 films—entertainment, educational, and religious.

HUNTINGTON PARK

Theodore N. Rogers Productions
Approximately 10 films—entertainment, educational, and religious.

(*Continued on page 29*)

New 3rd-Dimension Screen

For projection of three-dimensional still pictures Radiant Manufacturing Company has brought out a new portable projection screen, trade-named "Stereo-Master." It has an aluminum-treated surface which is held perfectly tight and flat, it is claimed, by means of a ratchet device called "Tensi-Lock." The new screen is available in two sizes—40" x 40" and 50" x 50".

Kodak Dividend to Employes

For the 41st year, this March, Eastman Kodak workers, like stockholders, will receive a dividend based on the company's profits. This year more than 22 million dollars will be shared among more than 50,000 employes—an average of $440 each, although all employees do not receive the same amount. The dividend is in addition to wages and does not affect the wage scale.

Under the plan, there are no wage dividends unless the common stock dividend is more than 70 cents per share. For each 20 cents common stock dividend above 70 cents, the wage dividend is one-half per cent. The 1952 common stock dividend was $1.80 per share. This is $1.10 more than 70 cents; since 20 goes into 110 5½ times, the wage dividend rate is ½ times 5½, or 2¾ percent. Each individual employe's wage dividend is 2¾ percent of his total earnings during the five-year period 1948-1953, and the actual payment to each varies accordingly. Payment takes place March 6th.

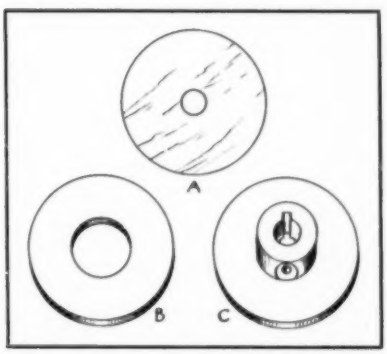
Alligator-clip extension leads save time in emergency whenever a replacement part can be clipped into circuit by such means, and properly installed after the show is over. Many or most of the condensers, resistors, and even transformers that are stocked in any theatre as emergency spares can be connected into action in this way, the fautly part they replace being snipped out of circuit with diagonal pliers. A replacement that would otherwise take many minutes can be thus accomplished in a few seconds.

LETTERS TO THE EDITOR

To the Editor of IP:

In the box to which this is attached you will find a device (illustrated below) which I have used for 12 years and found a complete answer to the problem of maintaining satisfactory upper reel pull-down tension.

Proper tension is that which completely eliminates oscillation or non-uniform reel speed. Irregular reel speed, if it exists, may be a sizable cause of damage to film perforations. To avoid this, many projectionists do not oil the upper reel shaft bearing, but I think that is mechanically wrong.



B represents an ordinary iron washer, outside diameter measures 1¾ inches; diameter of hole, ¾ inch. C shows this washer united with Simplex part C-282. This part has a ¾ inch outside diameter, and is pressed into the washer in an ordinary bench vise. A is a leather washer used in place of Simplex leather washer MA-143. The result is a larger friction surface, for steadier pulldown tension.

Therefore, I have made this device. The usual collar on the reel shaft inside the upper magazine (*Simplex part C-282—Ed. note*) is modified by the addition of an ordinary washer of 1¾-inch o.d. The pressure that can be obtained from ordinary vise jaws will do this job. A leather washer 1⅝-inch o.d. is then used instead of the regular washer (*instead of Simplex washer MA-143—Ed. note*).

Pressure Improved

When this modified equipment is installed on the upper magazine shaft, I find that the spring adjusting collar, or nut, located outside the magazine will have to be turned toward the shaft end so that the nut side is about flush with the end of the shaft. This places a satisfactory amount of pressure on the leather disc, and the pressure will remain constant for years.

Please extend to Mr. Mitchell my thanks for the great amount of information which he has packed into the pages of INTERNATIONAL PROJECTIONIST.

ARNO WOLD
Opportunity, Wash.

To the Editor of IP:

In regard to safety and nitrate motion picture film I feel it quite understandable that some of the craft's elders or seniors dislike to adapt themselves to the use of safety film. As you mentioned in the article, by now we've all been using safety prints for a long while, and the only difference there seems to be from here is that it requires a bit more time and care to splice.

I feel the present-day safety stock film picture image is quite equal to the usual nitrate stock image. It would seem to me that a good deal of the so-called beefing might well come under the saying of not being able to teach an old dog new tricks. I seriously doubt if any of the squawks and beefs come from these parts as it would be a waste of time to interfere with the wheels of progress. I myself like the stuff as little as a stiff starched shirt, which I can't wear. But I agree it's here to stay so let's get used to it, although some of the boys will perhaps continue to grumble.

AL KUIPER
Minneapolis, Minn.

Unsolicited Tribute

SOCIETY of MOTION PICTURE AND TELEVISION ENGINEERS

November 19, 1952

Miss R. A. Antracht
International Projectionist
19 West 44 Street
New York 36, New York

Dear Miss Antracht:

We here at SMPTE are particularly conscious of the need and the difficulty of maintaining in a technical publication, month after month, well-rounded coverage, prestige, attractive format and all the other things, most of them details, that are important to the publication's personality.

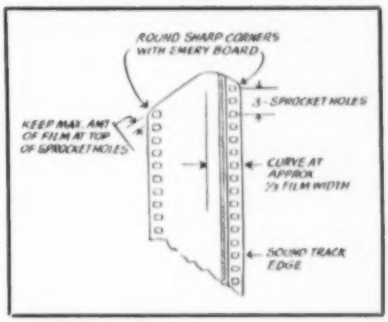
This morning the November issue of International Projectionist arrived, and it is in my opinion even better than usual. The transistor article is particularly good since it tells in ordinary language what transistors are, how they work and, without irresponsible flag-waving, what they hold for the future of our particular business. Please accept my personal congratulations for a good job well done. IP is a most useful service to the trade.

Kindest regards,

[redacted]
Executive Secretary

To the Editor of IP:

I notice that from time to time you publish good professional tips and I believe I have one worthy of publication in IP. I am referring to a good film-end clip to avoid excessive film-end damage. (See illustration below.) I, for one, like to have a good clean film-end to start in that ever-evasive reel slot.


ROUND SHARP CORNERS WITH EMERY BOARD
3-SPROCKET HOLES
KEEP MAX. AMT. OF FILM AT TOP OF SPROCKET HOLES
CURVE AT APPROX. ⅔ FILM WIDTH
SOUND TRACK EDGE

I find that this clip helps to keep the leaders and tails in better condition and for a longer time. Also, it is not always necessary to enter the film in the reel slot—one turn of the reel while holding the film firm on the hub until it overlaps and clinches will do the trick.

MAURICE S. GRACE
Local 150, Los Angeles

OBITUARIES

Calvin W. Bornkessel, 70, Local 253, Rochester, N. Y., died after a lingering illness. He was a charter member of the Local and held various official offices during the years. He served as president for nine years, and as business representative for four years. Bornkessel worked as projectionist at the Palace Theatre for twenty years, until illness forced him to retire several months before his death. He is survived by his wife and son, Frank, also a member of the Local.

Sam Kevitch, 63, Local 307, Philadelphia, Penna., died suddenly last month. He worked in the projection room of the Carman Theatre. *George James*, also a member of Local 307, died recently. For many years James worked as projectionist in the Kent Theatre.

William Weaver, 79, Local 143, St. Louis, Mo., died last month. Weaver was one of the oldest members of the Local, having joined the organization back in 1908.

Thomas J. Kearney, president of Local 162, San Francisco, succumbed to a heart attack following surgery. He joined the Local back in 1933, and served in various official capacities. He was appointed auditor for the Local in 1942 and held that post until 1947 when he was elected secretary. In 1951 he was elected president of the Local and held that office until his untimely death.

The American Labor Movement

Prepared by the Department of Labor for official use and reference, this history traces labor activity and legislation from Colonial times to today.

Chapter V
World War II and After
[Continued]

WORKERS in a number of the heavy mass-production industries obtained in many instances "package" increases estimated to be worth 15 cents an hour, including the value of added holidays with pay, health and welfare provisions, or other "fringe" benefits.

Yet, as prices continued to rise, workers found themselves worse off than when the war ended. By December 1947, the cost of living for the city worker averaged about 30 percent higher than on VJ-day.

Contract negotiations proceeded more slowly during 1948. It was late in May 1948 before general industrial resistance to wage increases was overcome by the unions. At that time General Motors signed a 2-year agreement with the United Automobile Workers (CIO) for an 11-cent hourly increase. This agreement provided also for subsequent automatic adjustments in wages based upon changes in the consumers' price index of the United States Bureau of Labor Statistics.

Other settlements soon followed. In June, the United Mine Workers negotiated a $1-a-day increase in wages and a boost from 10 to 20 cents in the payment, per ton of coal mined, to their welfare and retirement fund, which had first been established in a contract between the union and the Government in 1946. Several weeks later, the steel industry agreed to wage increases averaging 13 cents an hour.

Fringe Benefits

During 1949, emphasis in negotiations shifted from wages to pensions and other supplementary benefits intended to protect the health and welfare of workers and their families. This was particularly true after the United States Supreme Court, by declining to review a lower court decision in the Inland Steel case, ruled in effect that the problems of health and welfare, and old-age pensions were proper subjects for collective bargaining.

Particularly significant as a pattern were the pension and health benefits negotiated by the United Steelworkers of America (CIO) with all major steel producers, and by the United Automobile Workers (CIO) with the Ford Motor Co. The steel agreements were negotiated in the autumn of 1949 (after a strike that lasted more than a month) following rejection by the companies of pension and social insurance proposals suggested by a Presidential fact-finding board. The steel plans generally provided pensions of $100 a month, including payments under the prevailing social security laws, for employees retiring at age 65 after 25 years of service. Health and welfare benefits for both workers and their families were also included in these agreements.

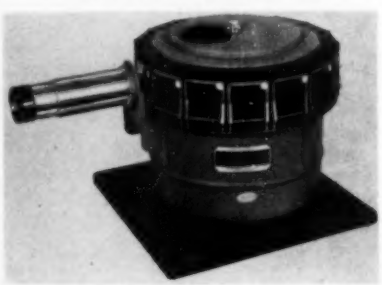
For over a century, trade-unions developed in the United States without specific Federal legislation to aid in their activities. Prior to 1926, the attitude of the courts in administration of the law as it related to labor had been primarily restrictive, with injunctions, damage suits, and criminal prosecutions in frequent use.

Recent Labor Legislation

The Railway Labor Act of 1926 was a significant reversal of the trend of legal opposition to union activity. This legislation, proposed by both management and the unions, was based on the premise that peaceful labor relations can be attained through free collective bargaining between employers and unions. This act was sustained by the United States Supreme Court in 1930.

The Norris-LaGuardia Act of 1932 brought to an end what has often been called the era of "government by injunction" in the history of labor-management relations. It eliminated major judicial restrictions on strikes, picketing, and boycotts. The act also eliminated the use of the "yellow dog" contract, and limited the liability of unions and their officers and members for unlawful acts of individual officers, agents, or members.

100-WATT SLIDE PROJECTOR



For small-slide projection in association with 16-mm showings, Tv studios, or for sales and advertising purposes, RCA offers this remote-controlled slide projector. It is equipped with a forced-draft-cooled 100-watt incandescent lamp, and has a coated f/3.5 lens. Turret accommodates 16 two-inch square slides, is motor-rotated and can be controlled from a distant location.

With the passage of the National Labor Relations Act of 1935 (Wagner Act), the Congress enacted its first law dealing specifically and entirely with problems of trade-union organization and activities outside of the railroad industry. This law guaranteed to employees "the right to self-organization, to form, join, or assist labor organizations, to bargain collectively through representatives of their own choosing, and to engage in concerted activities for the purpose of collective bargaining or other mutual aid or protection" (Section 7, NLRA).

The act created a National Labor Relations Board with two major functions: (1) to prevent and remedy "unfair labor practices" by employers which discourage or interfere with self-organization of employees or the practice of collective bargaining; and (2) to designate the bargaining representatives in the event of controversy over which union should represent employees or over the size and composition of the unit to be certified for bargaining purposes. As to the bargaining unit, the Board might decide as "appropriate" a unit composed of only skilled craftsmen, or all production workers in a factory or, in some instances, a number of different factories or emloyers depending upon the facts of the case.

Taft-Hartley Provisions

The growth of union membership from less than 4 million in 1935 to over 15 million in 1947 reflected the encouragement to collective bargaining expressed in the Wagner Act. A shift in legislative policy occurred with the passage of the Labor Management Relations Act of 1947 (Taft-Hartley Act). It was enacted in June 1947 in spite of strong objections by labor and a Presidential veto.

Certain agreement provisions, such as the closed shop, were banned under the revised law, while others, such as the union shop, check-off, welfare funds, grievance procedure, and contract termination provisions, were restricted or regulated. A list of "unfair labor practices"—actions which the unions might not undertake without violating the law—was added to counterbalance, according to its advocates, the unfair labor practices prohibited employers under the Wagner Act.

The Labor Management Relations Act also imposed certain limitations on strikes and lock-outs. Secondary boycotts, for example, became "unfair labor practices" and stoppages over such issues might be penalized by court action and law suits for damages.

(*Continued on page 27*)

IA-IP Amateur Radio Bulletins

All-Time Contest Winner

By AMOS KANAGA, W6BAA
Secretary, Local 409,
San Mateo, Calif.

Amos Kanaga

WINNER of the all-time high contest (no prizes in this one) for most IA stations worked since end of World War II is W6PFF, Brother Frank Champlin of Local 150 in Los Angeles. Congratulations, Frank!

Winners of the 1952 IA-IP contest (FB prizes!) will be announced in this column next month. By the way, gang, first winner has first choice among the prizes, next highest second choice, etc. This method of awarding 'em will enable you fellows to get the prize you would rather have.

Coming back to W6PFF, winner of the all-time high: he scored 65 confirmed and half a dozen not confirmed. Runners up, and pretty close, were W6MU "Barney" Barnett; W6DDQ, Phil Wisdom, and WφGSW Jim Evans.

W5DYV Brother Paul Belian of Local 604 crashed into the "IA-IP Worked 10" and is now hot after that Gold Award.

A Happy and DX New Year to you all!

FOR LATEST
ALPHABETICAL
LISTING OF
IA RADIO MEN
SEE NEXT PAGE

Super Snaplites are better indoors or out. Sharper Pictures, Greater Contrast, More Light, Better Definition all add up to happy patrons. Make your Movies Better Than Ever; use Super Snaplite lenses. Super Snaplite Projection Lenses give a true speed for f/1.9 in every focal length up to 7 inches. Ask for Bulletins 207 and 209.

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W1BCE—C. L. Crowley, L. 459, Norwich, Conn.
W1BHJ—Otto Halquist, L. 182, Boston, Mass.
W1BTW—J. Roland Lizotte, L. 546, Lowell, Mass.
W1BVB—Don Fancher, L. 439, New London, Conn.
W1EBO—Woodrow Guile, L. 459, Norwich, Conn.
W1GR—Al Hyde, L. 223, Providence, R. I.
W1LW—Norman Soules, L. 459, Norwich, Conn.
W1GND—Wilbur Tracy, L. 437, Brockton, Mass.
W1IYY—Harold Wyman, L. 96, Worcester, Mass.
W1JBU—George Gravell, L. 96, Worcester, Mass.
W1JWN—Ted Kahn, L. 86, Fitchburg, Mass.
W1KKJ—Howard Bruya, L. 505, Waltham, Mass.
W1NZE—Arthur Madsen, L. 182, Boston, Mass.
W1WI—Tom McNamara, L. 505, Waltham, Mass.

W2AMB—Fred Huff, L. 306, New York City
W2AOM—Jack Carrotson, L. 306, New York City
W2ARP—F. Ramhorst, L. 534, New Brunswick, N. J.
W2BOR—William Axton, L. 524, Glens Falls, N. Y.
W2BDK—Lloyd Matteson, L. 290, Gloversville, N. Y.
W2CYQ—Frank Larham, L. 108, Geneva, N. Y.
W2DZA—Alex Knight, L. 353, Port Jervis, N. Y.
W2HP—Jack North, L. 640, Nassau Co., N. Y.
W2HRJ—Charles Beckett, L. 462, Vineland, N. J.
W2HWF—A. Dietricht, L. 306, New York City
W2MYJ—Mike Revzin, L. 306, New York City
W2NAJ—Pete Hurgon, L. 306, New York City
W2NFU—Sydney Trisch, L. 306, New York City
W2OCL—Edward Ricca, L. 306, New York City
W2ORS—Charles Roop, L. 418, Camden, N. J.
W2PVB—K. H. Allfrey, L. 290, Gloversville, N. Y.
W2QYQ—Alfred Becket, L. 462, Vineland, N. J.
W2RQZ—Frank Lipinske, L. 337, Utica, N. Y.
W2RUA—Hugh Newcombe, L. 462, Vineland, N. J.
W2TSN—Victor Buffs, L. 365, Warren Co., N. J.
W2VSQ—Frank Tamborel, L. 306, New York City
W2WZX—Erick Pattky, L. 244, Newark, N. J.
W2ZCE—John V. Richards, L. 1, New York City

W3BBV—Nelson Stover, L. 283, York, Pa.
W3BJ—Al Edwards, L. 307, Philadelphia, Pa.
W3JMA—Ralph Rushworth, L. 181, Baltimore, Md.
W3KNY—Harris Good, L. 661, Reading, Pa.
W3MEY—Leo Foran, L. 335, Bradford, Pa.
W3MHE—Chas. Gibson, L. 444, New Kensington, Pa.
W3PMY—John Nordine, L. 296, Warren, Pa.
W3°XT—Bernard Rask, L. 171, Pittsburgh, Pa.
W3TVM—Harry Drew, L. 171, Pittsburgh, Pa.

W4AUS—Charles M. Moore, L. 568, Columbus, Ga.
W4AEI—Austin S. Baumann, L. 507, Macon, Ga.
W4BWN—Bob Cobble, L. 405, Knoxville, Tenn.
W4CIU—Bill Britton, L. 537, Jasper, Ala.
W4DPT—Adrian McCroskey, L. 446, Astoria, Ore.
W4EHC—Roland E. Coffee, L. 808, Gainesville, Ga.
W4EGG—Marvin Storler, L. 144, Memphis, Tenn.
W4FGK—D. Hoyle Knight, L. 412, Bradenton, Fla.
W4HJC—Arlie Bellflower, L. 225, Atlanta, Ga.
W4HRR—Joseph R. Good, L. 518, Augusta, Ga.
W4IU—Rupert E. Carter, L. 225, Atlanta, Ga.
W4JIC—Chat Ruffner, L. 264, Newport News, Va.
W4JXJ—Gilbert R. Knapp, Jr., L. 55, Roanoke, Va.
W4MCT—Jim Davis, L. 552, St. Petersburg, Fla.
W4KBJ—James File, L. 290, Gloversville, N. Y.
W4MEP—J. Wyatt, L. 793, Huntsville, Ala.
W4NOM—Buddy Rogers, L. 225, Atlanta, Ga.
W4PKT—M. H. Sanders, L. 507, Macon, Ga.
W4RFF—Howard Ross, L. 574, Greensboro, N. C.
W4RMT—E. M. Karcher, L. 482, Champaign, Ill.
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W5COQ—Rajmund J. Machu, L. 597, Waco, Tex.
W5DYV—Paul Belian, L. 604, Corpus Christi.
W5IBI—Wm. Armstrong, L. 183, Beaumont, Tex.
W5IIP—Pat Talbot, L. 249, Dallas, Tex.
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W6AGN—Arthur Hansen, L. 297, San Diego, Calif.
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W6AOR—Francis Sarver, L. 695, Los Angeles.
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W6BWF—James Miller, L. 695, Los Angeles.
W6BWI—Harry Morse, L. 297, San Diego, Calif.
W6GAG—August DeGrazia, L. 150, Los Angeles.
K6CH—H. H. Quackenbush, L. 501, Chico, Calif.
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W6GMN—William Schuch, L. 659, Los Angeles.
W6COF—Harold Stock, L. 695, Los Angeles.
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W6DDA—Ken Schouten, L. 44, Hollywood, Calif.
W6DDF—Harry Fay, L. 695, Los Angeles.
W6DDQ—Philip Wisdom, L. 695, Los Angeles.
W6DP—William Snyder, L. 695, Los Angeles.
W6DPU—Roy Brann, L. 150, Los Angeles.
W6DYJ—Ed Pothier, L. 215, Bakersfield, Calif.
W6EAQ—E. L. Kline, L. 150, Los Angeles.
W6EFL—A. H. Whitney, L. 150, Los Angeles.
W6EIR—Leroy Ward, L. 521, Long Beach, Calif.
W6EJH—Jack Lilly, L. 695, Los Angeles.
W6EP—Leslie Hewitt, L. 695, Los Angeles.
W6EUW—Anthony Bayer, L. 504, Santa Ana, Calif.
W6EWU—Tom Wells, L. 297, San Diego, Calif.
W6FBW—Elbert Amarantes, L. 431, San Jose, Calif.
W6FGV—Norman Owens, L. 521, Long Beach, Calif.
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W6FKZ—Rou Raguse, L. 695, Los Angeles.
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W8WSL—Denzel Murphy, L. 239, Fairmount, W. Va.
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W8SXD—Dan Denfenbaugh, L. 735, Mt. Clemens

W9AZA—Ken Mass, L. 721, Elkhorn, Wisc.
W9DBY—Ken G. Alley, L. 421, Herrin, Ill.
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W9GQD—Clarence Hawkins, L. 263, Richmond, Ind.
W9HQ—E. M. Renfroe, L. 110, Chicago
W9LBL—R. B. Connelly, L 110, Chicago
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W9PTH—Larry Applegate, L. 187, South Bend, Ind.
W9RTA—Herb Kleinbeck, Sr., L. 110, Chicago.
W9VNV—Charles Mitten, L. 194, Indianapolis, Ind.
W9TTM—Phil Richardson, L. 421, Herrin, Ill.

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WØGSW—J. E. Evans, L. 242, Pittsburg, Kans.
WØJKU—John Cresap, L. 242, Pittsburg, Kans.
WØQI—E. Van Duyne, L. 191, Cedar Rapids, Iowa
WØSJK—O. S. Keay, L. 219, Minneapolis
WØSLV—Walker Fausett, L. 395, Ann Arbor, Mich.
WØSWM—Earl E. Leonard. L. 695, Los Angeles
WØUOP—Clair Rockholz, L. 286, Des Moines, Iowa
WØVBZ—R. H. Hecht, L. 143, St. Louis, Mo.
WØWHV—Max Hollingsworth, L. 465, Joplin, Mo.
WØWSH—H. Allredge, L. 443, Jefferson City, Mo.
WØZIM—M. Geiskieng, L. 230, Denver, Colo.

Canada

VE1ACB—F. J. McGuire, L. 680, Halifax, N. S.
VE1DQ—Art M. Growell, L. 680, Halifax, N. S.
VE3ABV—Jack Snider, L. 173, Toronto, Ont.
VE3AHJ—Walt Mann, L. 467, Ft. William, Ont.
VE3AYQ—C. D. O'Neill, L. 461, St. Catherines, Ont.
VE3APR—Harry McClelland, L. 582, Brantford, Ont.
VE3BAK—F. Winkle, L. 173, Toronto, Ont.
VE3BVC—E. H. Whyat, L. 173, Toronto, Ont.
VE3BWG—Lou Lodge, L. 173, Toronto, Ont.
VE3BZJ—L. R. Kilbourne, L. 622, Port Huron, Mich.
VE3DBF—M. Winslow, L. 461. St. Catherines, Ont.
VE3DFK—Frank Barkey, L. 173, Toronto, Ont.
VE3DLX—Ed Barber, L. 580, Windsor, Ont.
VE3OG—H. Horner, L. 173, Toronto, Ont.
VE3TE—Tom Burrows, L. 173, Toronto, Ont.
VE5AR—L. W. Nelson, L. 406, Moose Jaw, Sask.
VE5JK—Jack Kyle, L. 295, Regina, Sask.
VE5RJ—Ron Marchant, L. 300, Saskatoon
VE7ACB—F. J. McGuire, L. 680, Halifax, N. S.
VE7ALW—Merle Wilson, L. 348, Vancouver, B. C.
VE7APN—Jack Stone, L. 348, Vancouver, B. C.
VE7APU—Tom Hepple, L. 348, Vancouver, B. C.
VE7BJ—Edward S. Brooks, L. 348, Vancouver, B. C.
VE7MN—C. H. Richards, L. 348, Vancouver, B. C.
VE7OT—Marvin Thoreau, L. 348, Vancouver, B. C.
VE7US—C. Moorehouse, L. 348, Vancouver, B. C.

AMERICAN LABOR MOVEMENT

(*Continued from page 24*)

Special rules were written into the law governing controversies or strikes which imperil the national health or safety. In any such dispute or strike, the President of the United States may appoint a "board of inquiry" to investigate the facts. Thereafter, an injunction forbidding the occurrence or continuance of a stoppage for a period of 80 days can be obtained. During this "cooling off" or "waiting" period, further efforts are made to settle the dispute. If no voluntary agreement is reached within 60 days, the employees are given the opportunity to vote by secret ballot as to whether they accept the "final offer" of their employer. After all these steps are taken, however, the law requires that the injunction be dissolved.

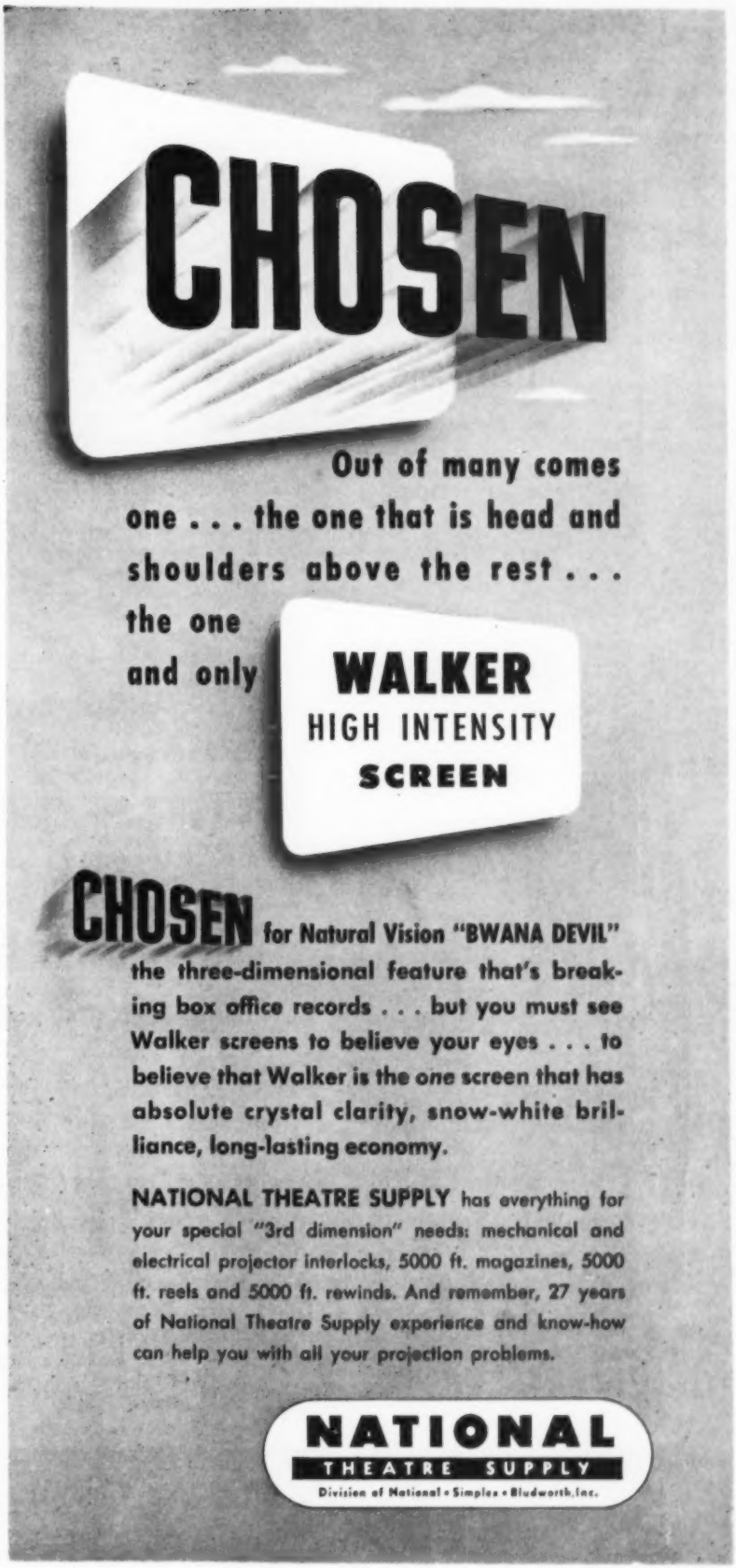
It is important to emphasize that under the law workers in the United States are not prohibited from quitting their jobs in attempts to improve their wages or working conditions. The "right to strike" is considered by organized labor as a part of the guarantee in the United States Constitution which forbids "involuntary servitude."

In addition to legislation regulating labor-management relations, other important acts dealing with wages and hours, social security, employment security, job training, and workman's compensation have been enacted during the last 25 years for the benefit of the working man. Probably the most important of the Federal laws, from the standpoint of number of workers covered, are the Fair Labor Standards Act, which sets minimum wage and hour standards for workers manufacturing goods for, or engaged in, interstate commerce; and the Social Security Act, which provides old age and survivors insurance, unemployment insurance, and other benefits.

[TO BE CONTINUED]

New Film Cleaner

A chemical similar to refrigerator fluid is now offered by Du Pont for cleaning motion picture film. It is known as Freon-113, a fluorinated hydrocarbon, non-flammable, fast-drying. It is said effectively to dissolve and wash away oil and gums from photographic film without affecting the emulsion and without any damage to colors in color prints. Combined with beeswax or cetyl alcohol it is recommended as a lubricant for motion picture film; and can be so applied that it both cleans and lubricates in one operation. Du Pont adds that though Freon-113 is "much less toxic" than other cleaning preparations, it still should be used only in well-ventilated rooms, and the hands of the user protected by rubber or neoprene gloves.


CHOSEN
Out of many comes one . . . the one that is head and shoulders above the rest . . . the one and only
WALKER
HIGH INTENSITY
SCREEN
CHOSEN for Natural Vision "BWANA DEVIL"
the three-dimensional feature that's breaking box office records . . . but you must see Walker screens to believe your eyes . . . to believe that Walker is the one screen that has absolute crystal clarity, snow-white brilliance, long-lasting economy.
NATIONAL THEATRE SUPPLY has everything for your special "3rd dimension" needs: mechanical and electrical projector interlocks, 5000 ft. magazines, 5000 ft. reels and 5000 ft. rewinds. And remember, 27 years of National Theatre Supply experience and know-how can help you with all your projection problems.
NATIONAL
THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

NATURAL VISION

(*Continued from page 8*)

not be levelled. It is installed at a distance below the port that will provide easy clearance for removing the filter. (The filter is removed from the port for cleaning and also whenever a standard, non-stereo show is projected. Cleaning—of both sides of each filter—is done daily with Staticmaster brush.)

The filter marked "left" is installed over the left port facing the screen and the one marked "right" over the other; each filter also is marked on either side "toward lens" and "toward screen," and is installed accordingly. The spare filters also are so marked—this is why two spares are needed; they are not interchangeable.

The instructions add this warning: NEVER PROJECT WHITE LIGHT THROUGH THESE FILTERS. YOU WOULD RUIN THEM.

Running the Show

Following are the exact instructions given for running the picture *Bwana Devil*.

This show consists of four 23″ reels marked as follows: "Left First Section," "Left Second Section," "Right First Section," and "Right Second Section." Each section runs approximately 50 minutes.

Thread reel marked "Left First Section" in left machine facing screen. Thread reel marked "Right First Section" in right-hand machine facing screen. Be absolutely positive that start marks are threaded the same on both projectors as a difference of one frame between projectors is noticeable and results in eyestrain to the viewers.

Focusing before the show starts is done without wearing polaroid glasses. For proper focusing start both projectors, open left machine light and focus same. When sharp focus is obtained douse this light, open light on right machine and focus. Mark the position of each adjustment. Whenever regular pictures are to be shown remove the filter and re-focus. Mark this focus adjustment position also.

During Operation. The credit titles of *Bwana Devil* afford an excellent opportunity for checking horizontal lineup and focus.

To check horizontal lineup do *not* wear glasses. Both titles should be superimposed. If titles are not in proper alignment use framing handle on one projector only.

To check focus wear glasses. Cover left eye. Check focus on right machine. Then cover right eye and check focus on left machine.

Film Break. In the event of a break in the film, stop the projectors immediately and proceed as follows:

If your print has footage numbers, use a china marker to give you start frames on the same number on both projectors.

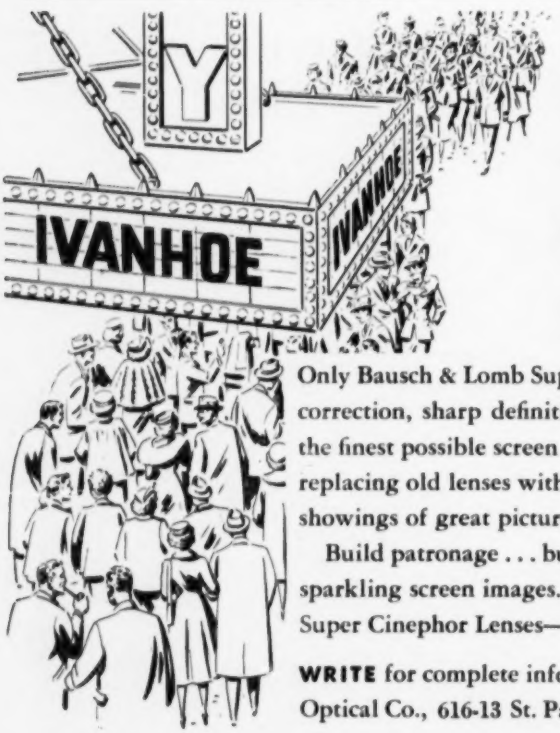
In the event your print has no footage numbers, pull down to first frame of next scene on both projectors. Use this first frame as start mark. Mark starting frames "Top" and "Bottom" to avoid any chance of misframe on starting.

When patching *Bwana Devil* film, if it becomes necessary to sacrifice a frame or frames, insert an equal number of frames of opaque leader so that the two reels will always remain matched, and run sound from the unpatched reel.

Because 23″ reels are used, it is necessary to raise the rewinder approximately three inches. This can be done by remounting it on a suitable block of wood or, preferably, by having an iron strap support bent to shape by any local iron worker.

Free Eastman Film

Running 13½ minutes, a 16-mm Eastman Kodak Kodachrome sound film entitled "Behind Your Snapshot" is distributed without charge to the borrower except for postage and insurance. It is "institutional advertising" that takes the audience behind the scenes in the manufacture of photographic film, showing the processes of production and the care taken to assure proper and uniform quality. Bookings can be arranged through Eastman's Camera Club and School Service, 343 State Street, Rochester 4, New York.



Leading Chains and Drive-ins CHOOSE B&L SUPER CINEPHOR LENSES

Only Bausch & Lomb Super Cinephor Lenses provide the extreme color correction, sharp definition and edge-to-edge brilliance necessary to project the finest possible screen images. That's why theatres nation-wide are replacing old lenses with Super Cinephor Lenses for their showings of great pictures.

Build patronage . . . build profits . . . with vivid, sparkling screen images. Replace NOW with B&L Super Cinephor Lenses—*44% to 100% brighter!*

WRITE for complete information to Bausch & Lomb Optical Co., 616-13 St. Paul St., Rochester 2, N. Y.

Bausch & Lomb *Super Cinephor* Projection Lenses

LOCAL 16-mm SOURCES

(Continued from page 22)

LAGUNA BEACH

Audio-Visual Supply Co., Inc.

Approximately 180 films — educational and religious; distribution restricted to California, Arizona, and Nevada.

LONG BEACH

Long Beach Public Library
Film Service

Approximately 100 films — informational, religious, and sponsored; distribution restricted to holders of public library cards and for group use only.

Merkle Film Library

Approximately 250 films — entertainment and religious.

U. S. Coast Guard
Commander, Eleventh Coast Guard District

Approximately 20 films — on the Coast Guard and its activities; distribution restricted to Eleventh Coast Guard District.

LOS ANGELES

Anti-Defamation League of B'nai B'rith
Pacific Southwest Regional Office

Approximately 25 films—educational and religious, primarily on intercultural understanding; distribution restricted to geographical region.

Canadian National Railways
Motion Picture Library

Ten films—travelogues on Canada; distribution restricted to geographical region.

Canadian Pacific Railway

Approximately 40 films—travelogues on Canada; distribution restricted to geographical region.

Cine-Craft

Approximately 200 films — entertainment shorts; distribution restricted to Los Angeles area.

Congregational Christian Churches
Department of Visual Aids

Approximately 20 films—religious; distribution primarily to churches.

Craig Movie Supply Co.

Approximately 500 films — entertainment and educational; distribution restricted to 11 Western States.

William M. Dennis
Film Libraries

Approximately 900 films — entertainment, educational, religious, and sponsored.

Films, Inc.

Approximately 1,500 films—entertainment, educational, and religious.

General Electric Co.
Advertising and Sales Promotion

Approximately 50 films—educational and sponsored; distribution restricted to Los Angeles area.

Ideal Pictures

Approximately 6,000 films—entertainment, educational, religious, and sponsored; distribution restricted to geographical region.

Los Angeles County Museum
Exposition Park (17)

Approximately 400 films—educational, including Spanish-language films.

Los Angeles Public Library
Film Service

Approximately 200 films—educational and sponsored; distribution restricted to Los Angeles.

The Methodist Publishing House
Audio-Visual Department

Approximately 1,500 films—primarily religious; distribution restricted to geographical area.

A. F. Milliron Co.

Some films, number not reported—educational and sponsored.

National Conference of Christians and Jews

Approximately 15 films — on racial and religious understanding; distribution restricted to geographical region.

North American Aviation, Inc.
International Airport

Three films—on jet aircraft and guided missiles.

Pan American World Airways

Twelve films—primarily travelogues; distribution restricted to Los Angeles area.

Presbyterian Distribution Service

Approximately 80 films—all religious; distribution restricted to geographical area.

RKO Radio Pictures, Inc.

Approximately 300 films — primarily entertainment features; distribution restricted to geographical region and prior location approval.

Ralke Co.

Approximately 150 films — entertainment, educational, and sponsored.

Singer Sewing Machine Co.
Manufacturers Agency

Five films—on sewing and sewing machines; distribution restricted to surrounding territory.

Standard Talking Film Service, Inc.

Approximately 150 films—educational and informational, all sponsored films; distribution restricted to geographical region.

U. S. Department of Commerce
Civil Aeronautics Administration

Approximately 400 films—on aviation education and training.

U. S. Department of the Treasury
State Director, Defense Bonds Division

Three films—about the United States and the Korean situation; distribution restricted to California.

U. S. Marine Corps
District Headquarters Recruiting Station

Approximately 20 films—about the Marine Corps; distribution restricted to geographical region.

United World Films, Inc.

Approximately 2,000 films—entertainment, educational, religious, and sponsored.

University of California, Visual Education

Approximately 3,000 films — educational; distribution restricted to 8 Western States.

University of Southern California
Audio-Visual Service Department

Approximately 300 films — entertainment shorts and educational.

[TO BE CONTINUED]

THOUSANDS OF EXHIBITORS

with RCA SERVICE
and there's a reason why:
RCA SERVICE is

Prompt · Efficient · Courteous

RCA Service Company, Inc.
A RADIO CORPORATION OF AMERICA SUBSIDIARY
CAMDEN, NEW JERSEY

MEASURING SOUND ABSORPTION

(*Continued from page 20*)

crophone is moved up and down along the tube by the steel pipe until the reading on the vacuum-tube voltmeter (electronic voltmeter in Figure 1) indicates that the microphone is in the neighborhood of a point of minimum sound pressure. The pipe is then clamped and the microphone position readjusted by the threaded rod until the exact pressure minimum is found. The minimum reading of the voltmeter in decibels is recorded.

The microphone is then moved in the same way to a point of maximum sound pressure and the voltmeter reading again recorded. The difference between these two readings is designated *delta db*. The absorption coefficient corresponding to the delta db is found from Table 1.

Simulated field measurements made on samples of some 50 acoustic materials by the long tube method and the reverberation room method resulted in an average difference of –0.07. It is assumed that the tube method gives results too low by this amount, and 0.07 is applied as a correction to each coefficient measured by the tube. Therefore, the absorption coefficient corresponding to delta db and found from Table 1 is corrected by adding 0.07.

Results Obtained

In a series of measurements made on acoustic plaster, it was found that the absorption coefficient varies from point to point by considerable amounts, and that differences in absorption coefficient are closely correlated with differences in the appearance of the material. On acoustic plaster, therefore, it is important to make measurements on as many different locations as practicable, and especially on as many points having different surface texture as practicable. Acoustic tile appears to be more uniform, and it may not be necessary to sample as many points on tile as on plaster.

The availability of a portable apparatus for non-destructive field testing makes it possible to correlate the appearance of a small area of acoustic plaster with its sound absorption. It is believed that the workmanship of the plasterer affects the sound absorption of the finished plaster to a large extent, but it is not known just how the plaster should be applied for best results. The details of workmanship that are believed to affect sound absorption include the pressure of the trowel on the plaster, time of final troweling after application, consistency of mix, and the texture imparted to the surface. Different textures are obtained by the use of a stiff straw brush or a nail perforator, or both. Considerable difference of opinion exists concerning the importance of each of these factors and their proper manipulation.

The development of the long-tube method makes possible objective evaluation of these various factors. It makes possible measurement of the sound absorption of small areas, so that samples of many different types of workmanship can be taken.

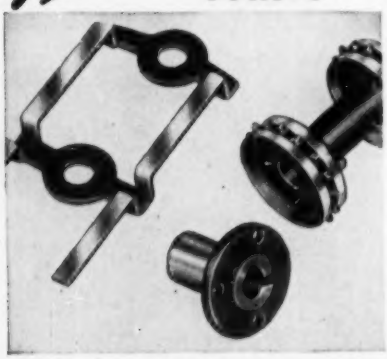
Another recent example of the usefulness of the long-tube method was the task of measuring the sound-absorption coefficients of two batches of commercial acoustic tiles. It was desired to select from each batch a smaller group of tiles nearly homogeneous in sound absorption.

The necessity of avoiding transverse modes of vibration sets an upper limit to the frequency at which a tube can be used. The lower limit of usable frequency is set by the requirement that the tube must not be too long for easy handling. These limits restrict the tube described here to frequencies near 512 cps.

Improvements in the Instrument

It would be possible to cover the frequency range from 256 to 2,048 cps by making use of a separate tube of suitable size for each frequency. This has not been done because of the awkwardness of such an arrangement. However, it appears possible to replace the long tube with a short one which, in essence, is so short as to constitute a cavity. Such a device would be readily portable, and should operate over an extended frequency range. A preliminary investigation of this method has been started.

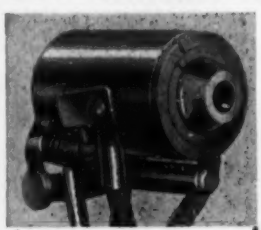
Free PROJECTOR PARTS



No, we're not giving them away—but, if Projection equipment is maintained the resulting patron satisfaction will boost Boxoffice sales to more than offset the cost—Your theatre will earn more and at the same time earn an enviable reputation for good showmanship.

LAVEZZI MACHINE WORKS
4635 West Lake Street
Chicago 44, Illinois

CUT CARBON COSTS! INCREASE LIGHT!



MADE FOR MOST ALL MAKES OF LAMPS

Get High Intensity Results from your Present Equipment
WITH
HUFF'S CARBON COOLERS
No copper coated carbons needed. Less amperage. Simple installation.
See Your Dealer or write for new folder direct to . . .
HAL I. HUFF MFG. CO., 659 W. Jefferson Blvd., Los Angeles 7, Calif.

Film-Weld
TRADE MARK
Successor to Film Cement

• The NEW, improved, positive method of permanently patching all types and makes of film—8mm., 16mm., 35mm., Trucolor, Technicolor, Kodachrome, Nitrate and Safety Film.

Used and endorsed by Projectionists in countless theaters.

specifically for *lasting* Patches.

ESSANNAY ELECTRIC MANUFACTURING CO.
1438 North Clark Street Chicago 10, Illinois

NEW COLOR TV TUBE

(*Continued from page* 14)

strips during one field; deflected in the opposite direction to activate the "blue" strips during another field; or not deflected at all, in which case it activates the green strips—as in Figure 2. These strips being very narrow, the human eye cannot resolve them at distances of more than a foot or so; the three merge into one full-color picture.

If no color filters are used at the TV camera, the successive fields will not differ from each other according to the color values of the scene being televised; hence, at the receiving end, the scanning of the three phosphors will not vary according to color but remain in balance, and thus merged in balance, will look white. The tube, therefore, reproduces either black-and-white or color images, whichever is transmitted.

It does need a band width 2½ times as wide as conventional black-and-white transmission to convey comparable information, however. Nominally, the bandwidth should be three times normal, since each field is transmitted three times, once in each color; whereas for black-and-white the same amount of detail is conveyed by transmitting each field once. However, Paramount decided to make its operation compatible with the color standards of the Columbia Broadcasting System, using a bandwidth approximately 2½ times that of standard telecasts.

As a standard of color performance Paramount chose Technicolor 35-mm motion picture film results. The new tube approaches, possibly does not completely equal, Technicolor quality; observers who saw the tube demonstrated in the New York Paramount Laboratory called the color quality very, very good.

Theatre TV Requirements

For large-screen theatre use, the tube would have to be operated at very much higher voltages. The accelerating voltage —that is, the potential that attracts the electrons of the beam to the fluorescent surface—is now approximately 5,000 volts. This produces an image of adequate brightness for home or industrial use; but if that image were to be optically enlarged to fill a theatre screen, an enormous increase in brightness would be needed, to produce which the accelerating potential would have to be upped to the 50,000—100,000 volt range.

At present, with an accelerating voltage of 5,000, the "red" and "blue" grid potential difference is about 15,000 volts. If the accelerating voltages were upped to 50,000, that grid potential would have to be increased to 150,000. Obvious problems, possible arc-over, for example, present themselves. Paramount is working on these.

The phosphors, however, will withstand the higher voltage needed for theatre TV, it has been definitely ascertained. These phosphors are: for red, a mixture of maganese and zinc phosphate; for blue, a mixture of calcium, magnesium and silicon oxides, with titanium; for green, zinc, silicon dioxide and manganese.

Recent TV Installations

Simplex large-screen theatre television system, manufactured by General Precision Laboratory, was installed in the Gopher Theatre, Minneapolis, in time to enable the theatre to participate in the nation-wide TV showing of Metropolitan Opera Company's *Carmen*. The Gopher seats 1,028. National Theatre Supply made the installation.

Motiograph announces recent installations of Trad Dual large-screen TV systems in theatres in Alabama, California, Florida, Georgia, Illinois, Iowa, Louisiana, Massachusetts, New Jersey, N. Carolina, Oregon, and Washington.

Theatre TV Pays, Says O'Brien

Events of the past month have definitely established theatre TV as a practical commercial proposition, RCA's J. F. O'Brien asserts in a statement to the trade press.

The success of the telecast of "Carmen" combined with the television "convention" of James Lees and Sons' carpet salesmen, demonstrate that the theatre owner's stake in TV is now "a question of hard cash to be made or passed up at the boxoffice," according to O'Brien.

Carmen was presented, at very advanced rates, by 31 theatres in 28 cities, 23 of these theatres being RCA-equipped. And 18 theatres in 17 cities staged the Lees "convention." (Lees management explains that they calculated it would cost them less to rent TV-equipped theatres during morning hours and transmission facilities, rather than pay the time and expenses of bringing in their sales people to an ordinary type convention.)

O'Brien, who is in charge of sales of all theatre equipment for the RCA Victor Division, points to the additional revenue from the advanced prices charged for Carmen, and to the paid use of theatre facilities for conventions during otherwise valueless hours, as evidence that theatre TV is now becoming profitable to the theatre.

French West Indies have eighteen 35-mm theatres with a total capacity of 7,150, and twenty-nine 16-mm houses with a total capacity of 9,300, the Motion Picture and Photographic Products Division of the Department of Commerce reports.

THE OPERATORS' FAVORITE!
Gold E's Automatic Enclosed Rewind Always Works! Silent, safe, U.L. approved! Eliminates fire hazard. Positive friction . . . can't clinch film. Tilt-back case . . . reels can't fly off. Microswitch safety cut-off . . . when door opens or film breaks, motor stops!
AT BETTER THEATRE SUPPLY DEALERS
GOLDE MANUFACTURING COMPANY
DEPT. IP. 4888 N. CLARK ST. • CHICAGO 40, ILL.

What's new at Century for THEATRE OWNERS?
THE NEW CINERAMA PROJECTORS
CENTURY scores again . . . for CENTURY PROJECTORS are the choice when performance demands the best.
CENTURY projection is the choice for CINERAMA—the new "3rd dimensional" motion picture.
Steadier pictures—Cooler apertures—Less film distortion—Better projection.
For theatres or drive-ins; large or small, use CENTURY PROJECTION & SOUND for your own and customer satisfaction.
See your CENTURY dealer or write:
CENTURY PROJECTOR CORPORATION
729 Seventh Ave., New York, N. Y.

PERSONAL NOTES

E. A. DICKINSON of Westrex Corporation's New York office traveled to Johannesburg, South Africa, to supervise the installation of Westrex recording equipment in the studios of Alexander Films.

HOWARD WILSON is new Midwest district manager for Radiant Manufacturing Corporation, maker of projection screens. Wilson is a former football and track star of Illinois State College, where he studied Audio-Visual methods of education.

M. F. (MARTY) BENNETT has been promoted by RCA from the post of manager of theatre equipment sales in the Engineering Products Department to membership in RCA Victor's regional management staff. The promotion was announced by A. R. HOPKINS, general sales manager of the Engineering Products Department.

C. L. A. WYND has been named assistant general manager of the Eastman Kodak Company's Kodak Park Works, sharing rank and responsibility with GEROULD T. LANE. I. N. HULTWAN, Kodak vice-president, announced the appointment.

A. JOHN (JACK) PLATT has been made manager of theatre equipment sales for RCA Victor, succeeding MARTY BENNETT, who has been advanced. Platt was formerly with RCA Service Company, resigned in 1948 to join Midwest Theatre Supply of Cincinnati, rejoined RCA in 1949 as theatre sales representative.

Recent changes at Eastman's Kodak Park Works include appointment of DR. LOUIS K. EILERS to be administrative assistant to the general manager; DR. AUSTIN J. GOULD to be assistant manager of film manufacture; EUGENE R. CLEARMAN to become superintendent of roll coating and E. PHILIP KRON as purchasing engineer.

ARTHUR J. HAMMER is the new RCA Victor regional manager in the Southwest, with headquarters in Dallas, Tex., succeeding JAMES W. COOKE, retired.

1952: WONDER YEAR

(*Continued from page* 12)

theatres (page 27). As a commercial proposition Synchro-screen itself dates back to 1951. Its claimed advantages and alleged drawbacks were vigorously debated in IP for January, page 16; February, page 18, *e.g.*

Synchro-screens were designed essentially for smaller-size theatres. Some rather large houses, however, also installed them and they subsequently were re-designed for theatres of every size. December's IP, page 27, reports an installation of Synchro-screen in the 3,100-seat RKO 58th Street Theatre in New York City, which won the approval of circuit exhibitors present to the extent that they instantly placed orders for their own theatres.

December's IP also reported a new optical recorder with no mechanically moving components (page 18), that may possibly prove an important factor in the current contest between magnetic and optical recording, and thus influence the ultimate nature of projection room reproducing equipment.

The same issue also reported (page 23) the commercial application of magnetic sound to 8-mm motion picture prints.

Stereoprojection

The year did not close without public, commercial presentation—highly profitable, too—of a full-length motion picture feature in three dimensions, based on the polaroid-spectacle principle. Details of this process are fully reported elsewhere in this issue, and need not be reviewed here. It should be added, however, that the initial box-office response in California, where the first showing was held, was such that arrangements were made forthwith for added showings in other parts of the country. As these lines are set down, the last week of December, technicians are busily installing Natural Vision equipment in a Dallas theatre.

Further, a number of individuals

SPLICES NOT HOLDING?

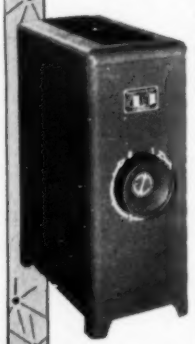
Film breaks are costly. Play safe by using

JEFRONA
All-purpose CEMENT

Has greater adhesive qualities. Don't take our word for it. Send for FREE sample and judge for yourself.

CAMERA EQUIPMENT CO.
1600 Broadway New York 19, N. Y.

WHY Strong RECTIFIERS ARE PREFERRED



The only rectifiers especially designed, manufactured and tested in one plant together with and for use with motion picture projection arc lamps. This is highly important, as efficient operation of each type and rating of arc necessitates a rectifier specifically engineered to its particular requirements.

There is a dependable Strong Rectifier for every type projection lamp:

2-Tube · 4-Tube · 6-Tube Single and Three Phase Models for

- Rotating Feed Angular Trim High Intensity
- Copper Coated Coaxial High Intensity
- 1 K.W. High Intensity
- Low Intensity

All assure smooth output current, long life, low operating temperature, and flexibility in control.

Write for Free Literature

THE STRONG ELECTRIC CORP.
City Park Ave. · Toledo 2, Ohio

PROJECTION LAMPS · SLIDE PROJECTORS
SPOTLIGHTS · RECTIFIERS · REFLECTORS

CLAYTON BALL-BEARING EVEN TENSION TAKE-UPS

For all projectors and sound equipments

All take-ups wind film on 2, 4 and 5 inch hub reels.
Silent Chain Drives

THE CLAYTON REWINDER
For perfect rewinding on 2000-foot reels.

CLAYTON PRODUCTS CO.
31-45 Tibbett Avenue New York 63, N. Y.

Invest In
U.S. DEFENSE BONDS
Now Even Better

thoroughly and intimately familiar with show business, and whose judgment most showmen would be inclined to trust, have told IP that the Natural Vision process can, in their opinion, do better than it did in the California performances—even though that showing was eminently impressive at the box-office. These persons say that the Natural Vision process did not enjoy its full advantage with the film *Bwana Devil*, but was handicapped by the nature of the story.

"If they had had a better picture," one of these competent observers opined, "third-dimension would have been in. The whole industry would have turned to it." Whether or not this judgment is truly valid will be known before too long.

A Great Year

To recap, 1952 has had no parallel in the history of the industry. As mirrored in IP's pages, the past year comprised these developments:

Heat-transmitting, light-reflecting mirror.

Magnetic soundtracks on projection prints (16-mm and 8-mm only thus far).

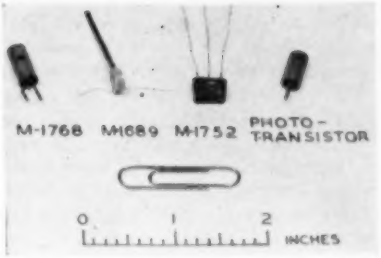
Consistent TV transmission for long distances beyond the horizon, speeding up the day when no theatre will be too remotely located to be linked into the nets.

Eidophor full-color, arc-illuminated large-screen TV accompanied by stereosound.

Cinerama: panoramic cinema accompanied by magnetic-track stereosound of amazingly perfect quality.

Large-screen TV in a drive-in theatre; plus $8,000-per-theatre average gross per evening for a TV boxing program.

Transistors, probable successors to vacuum tubes, going into commercial operation, and demonstrated, for the first time, in a variety of commercial proto-products.



Transistors, including photo-transistor at right, perform the same work as vacuum tubes while requiring in some cases as little as 1/1,000,000 as much power. This economy in power results from the fact that transistors need no high-temperature cathode, making heater or "A" current unnecessary.

Synchro-screen for large theatres.

Optical recorder with no moving parts.

Successful commercial three-dimensional full length feature utilizing polaroid spectacles.

All in one year! There has never been a year like it for the motion picture industry.

THEATRE SOUND REPRODUCERS

(Continued from page 17)

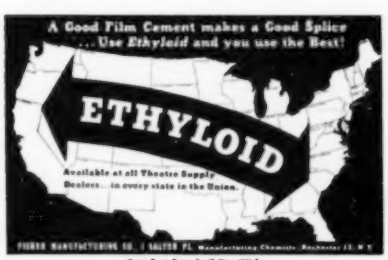
of his films José Iturbi actually struck the lowest "A" on the piano, and that we heard it clearly and loudly. Does this mean that our sound-system is capable of reproducing a sound of 26.667 cps? The answer, strangely, is—*no, not necessarily.* All that we heard, when that lowest "A" was sounded, were the 4 or 5 "A's" above it, fading in and fading out 26.667 times every second. Our system reproduced the "A's" whose frequencies are 53.333, 106.667, 213.333, 426.667 cps. at a periodicity of 26.667 cps. Whether it reproduced the actual fundamental or not is of little consequence, since in piano tone-quality the fundamental is very weak in the lower tones.

Recorded organ music is likely to be disappointing simply because the organ has a vast range of *pure tones*, in addition to tones rich in harmonics, and this range exceeds the power of present-day recording and reproducing systems.

Harmonics and Fundamentals

Harmonics—"overtones" which are in harmonic relationship to the fundamental, pitch-determining tone—impart to sounds their characteristic quality, or timbre. Lack of them results in a deep, hum-like tone. A few very high overtones produce flute-like and bell-like tones; while several loud overtones in the first few octaves above the fundamental result in warm, reedy, violin-like tones. The characteristic tones of all instruments can be imitated by electrically combining the various pure tones which go to make up the fundamental and harmonics of a compound tone. This is actually done in the electric organ.

The problem of reproducing human voices in perfect naturalness is primarily a problem of reproducing the complex patterns of overtones, since the fundamental tones of voices are weak. These fundamentals do exist; they range in frequency from 100 to 200 cps in the case of male voices, and from 180 to 300 cps in the case of female voices. Arti-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culation, however, depends on overtones which may extend up to 3,000 or 4,000 cps.

The strengths of the various overtones imparts to each person's voice a characteristic timbre which permits us to recognize our acquaintances merely by hearing them speak. The sounds which go to produce words are formed by modifying the relative strengths of the overtones during the act of speaking.

Types of Phono Pickups

The Phonograph pickup is a microphone modified in such a way that it generates currents in accordance with the movements of a needle which tracks the record-groove. The first phonographs were non-electric; and the needle imparted its movements to a diaphragm which set up pressure waves in the air, amplified only weakly by a horn.

The movement of the needle may be vertical (as in reproducers intended for playing the old Edison "hill-and-dale" records) or lateral. All modern records are lateral-cut, that is, the groove maintains a constant depth, but varies its position from side to side, thus imparting a horizontal vibration to the pickup stylus.

There are several types of electrical pickup in use. The magnetic pickup was once the most common type, but it has now been supplanted by the crystal pickup. The condenser pickup differs from both of these in that it produces variations in the strength of a constant DC bias voltage applied to its plates. Magnetic and crystal pickups are electric *generators*, and require no bias voltage.

Old-fashioned magnetic pickups are still used in many theatres for playing overture music even though they are so heavy that they "track" poorly and wear records very rapidly. They are, in fact, so heavy that only steel needles can be used in them. This makes the magnetic pickup a nuisance to the projectionist, who must change the needle after every one or two records in order to avoid distorted sound and undue record-wear.

The Magnetic Reproducer

The magnetic pickup is a *low-impedance* alternating-current generator. The simple armature coil, positioned between the poles of a powerful permanent magnet, is caused to vibrate by the phonograph needle fastened to it through a mechanical coupling device. Since at each vibration the armature-coil cuts through magnetic lines of force, a tiny pulse of current is generated, and appears as voltage at the output terminals of the device. The two leads are connected to the primary winding of a simple step-up transformer, which is usually located in the amplifier. The output of this "impedance-matching" transformer is fed directly to the grid of a voltage-gain tube in the amplifier, ordinarily through a volume-control potentiometer. Fig. 1 illustrates this hook-up.

As a general rule, pickup and grid-circuit impedances must be made equal in order to obtain a maximum transfer of power and a minimum of sound distortion. Since the impedance of a magnetic pickup is only a few hundred ohms, and that of the input circuit several thousand to several million ohms, the matching transformer must have hundreds of turns of wire in its secondary winding for every single turn in its primary.

The idea is exactly the same as that involved in the speaker impedance-matching transformer to which the output of an amplifier is connected, but with this difference: the output transformer steps the impedance down from the several thousand ohms impedance of the power-tube plate circuit to the 15 or 20 ohms impedance of the speaker voice coils.

As stated before, steel phonograph needles only should be used in heavy magnetic pickups. Many projectionists, in an attempt to avoid the necessity of frequent needle-changing, have made the mistake of using 1000-play osmiridium and 5,000-10,000-play sapphire needles in these pickups. Magnetic pickups are just too heavy for "semi-permanent" styluses. Not only will the needles themselves wear out in short order—and they *are* expensive!—but the records will be ruined. A single play with the wrong kind of stylus will cover the disk with a fine black powder chiselled from the grooves. The record is thereafter unfit for playing again.

In order to decrease the terrific needle-pressure on the record, the "tone-arms" of magnetic pickups are usually counter-balanced. This expedient, however, increases the mechanical inertia of the assembly to such an extent that the pickup will bounce on warped records, skipping grooves, or repeating on a single turn of the groove until someone gives it a gentle push toward the center of the record. Needless to say, a record too badly warped for satisfactory playing with a magnetic pickup is likely to be severely gouged by the needle.

This same inertia of the heavy magnetic pickup, however, is an advantage when it comes to reproducing low frequencies of recorded sound without distortion or mechanical intermodulation. The needle does all the vibrating because the pickup itself is too heavy and inert to shake on the bass tones.

Magnetic pickups may be used for playing both 78 rpm and 33 1/3 rpm *standard-groove* records, but *never* for playing the new 45 rpm and "Long-Playing" 33 1/3 rpm *microgroove* records! These newer records require light-weight pickups of high sensitivity and specially shaped jewel-point needles.

In view of the many undesirable features of magnetic pickups—the need for matching transformers being one of them (although many old-style amplifiers had built-in input transformers)—many projectionists have discarded them for modern crystal pickups.

[TO BE CONTINUED]

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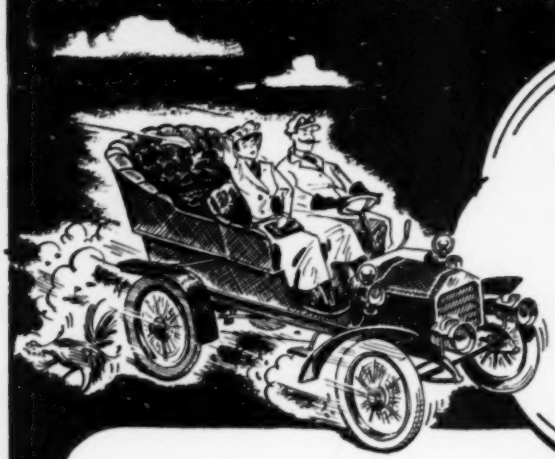

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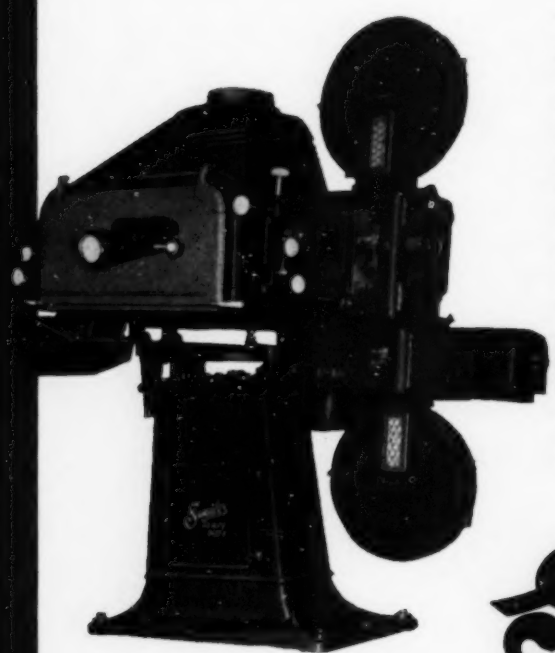

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